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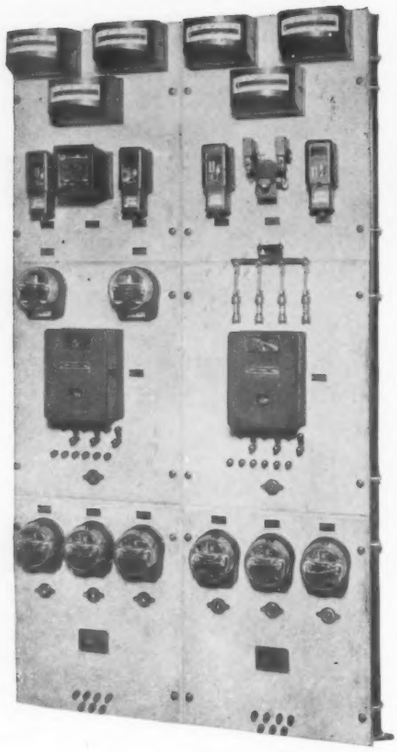

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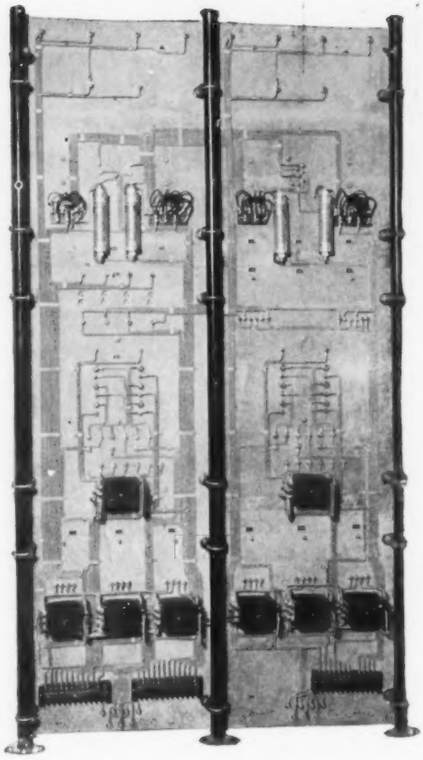

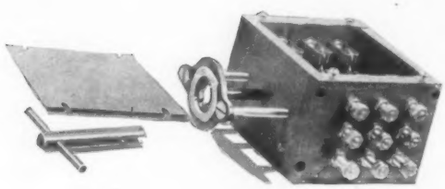

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Verdict Must Come from Our Readers

WHAT do you think of Electrical West? From a jury of some 6,000 readers the verdict is beginning to arrive. W. S. Berry, San Francisco manager of the Graybar Electric Company, writes that "the reading matter was particularly good, and the advertisements demonstrate that this department of your paper is among the best in the country." H. W. Crozier, consulting engineer, writes: "It was a pleasure to open Electrical West. The magazine is everything that the announcement led us to expect, and more." J. W. Wrenn, manager of appliances sales, Great Western Power Company, writes: "With a set-up of this kind continued, Electrical West is bound to have a great future."

This is encouraging, for Electrical West is your paper, published, edited and managed for your service. If you like the changes we have made, say so. If you do not, say so. Careful and constructive criticism can be of great benefit.

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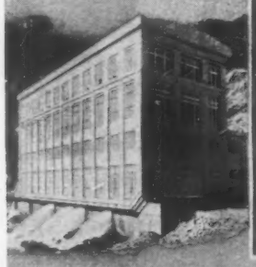

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C. T. HUTCHINSON, *Editorial Director* — A McGRAW-HILL PUBLICATION — G. C. TENNEY, *Managing Editor*

Volume 58 — San Francisco, February, 1927 — Number 2

Progress as Based Upon the Past, Present and Future

ANOTHER monument, this time inscribed with the year 1926, has been set up to mark the path of progress of the electrical industry. With each passing year these monuments have become larger, in line with the greater accomplishments of the industry. Nineteen twenty-six was no exception. A review of the year shows the industry prosperous and progressive, conscious of its past achievements and awake to the possibilities of the future.

From a construction standpoint, Western central stations were given a brief breathing spell, installed capacity having momentarily caught up with the demands imposed upon the power companies during the past ten years. Despite this fact there was an increase of 227,105 kva. in new plants. In accordance with the policy of extending service to the greatest number of people, many new transmission lines were built and expenditures for distribution facilities were the greatest in history. Interconnections between systems were effected allowing for the introduction of economies that will be shared with the public.

Public relations showed satisfactory progress. Sale of stock to customers was continued and has been reflected by increased public good will. Confidence of the electorate in the present system of utility operation was expressed in no uncertain terms in both California and Oregon where measures for state operation of the light and power industry were overwhelmingly defeated. With the exception of a few isolated cases, the utilities are on excellent terms both with the public and the politicians.

Another development apparently enmeshed in politics is the Colorado River problem. While a year ago there seemed to be some possibility of a settlement of this controversial question, nothing transpired during the year indicating that a solution is any nearer. As this issue goes to press the attempts of California and Arizona to settle their differences appear fruitless, while Utah's abrogation of the six-state compact nullifies whatever action Congress may take on the Swing-Johnson Bill.

Customer growth during the year added emphasis to the contention that aside from the normal increment of increase there will be a less number of domestic consumers added each year. With a few exceptions, the percentage of electrically lighted homes in the Western states is reaching the maximum. To increase consumption there has developed a commercial program embracing every phase of domestic electrification, from better lighting to refrigeration, cooking and heating. This program provides for careful study of sales methods, the application of tested merchandising principles, a larger sales organization and a more competent sales force. Its goal is an average domestic consumption three or four times the present national average. Similar activity is being shown in every new business field, including street and highway lighting, industrial power sales, commercial lighting and rural electrification. In all of these programs the manufacturer, jobber and dealer are charged with an important part.

A review of the past, a survey of the present and a study of the future prove that 1927 bids fair to excel the year just closed. That same confidence, courage and perseverance that have brought the industry to its present place of leadership justify the statement that none of the possibilities of the new year will be overlooked.

Herminghaus Decision not Disastrous but Unfortunate

ALTHOUGH the recent decision of the California Supreme Court in the case of Herminghaus vs. Southern California Edison Company has been characterized as disastrous to power and irrigation interests, a careful study of the facts indicates that unfortunate is possibly the better word to apply. A hasty examination of the map shows that the San Joaquin River is probably the only stream where an unhappy combination of circumstances would permit a similar legal controversy, at least insofar as the power companies are concerned. In the case of irrigators, however, there is ample opportunity in many sections for conflicts between the rights of riparian owners and those of appropriators, and the case of the riparian owners has been strengthened by the decision in question.

Other Western states where the doctrine of riparian rights is in force several years ago settled the dispute between riparian owners and appropriators by restricting the former to a reasonable use and permitting appropriation over and above the quantity of water necessary for this reasonble use. It was hoped that the California court would take a similar attitude in view of the progressive water development of the last ten years. Instead, in its present interpretation of the common law, the court followed the precedent set up in a decision rendered eighteen years ago, as pointed out in the review of the case on another page of this issue. Thus California finds itself with a record of development of its water resources for domestic, irrigation and power uses—all for the public good—that is comparable if not ahead of that of any other Western state, and, paradoxically, with interpretations of its water rights law almost two decades behind the times.

Legal authorities point to the dissenting opinion filed in the case as a more just and equitable interpretation of the common law of riparian rights. This opinion is based fundamentally upon the theory of the greatest good for the greatest number of people.

As to the courses open for the Southern California Edison Company there are two that can be adopted. It can appeal for a rehearing with a view of having the present injunction set aside or it can exercise its right of eminent domain and condemn the riparian rights of the Herminghaus properties.

In the meantime, irrigation interests through the California Irrigation Association have appointed a special committee for the drafting of legislation that will correct in some measure the present situation. Whether such legislation would be effective is a matter of opinion. From the standpoint of the layman it would appear that a broader interpretation of the common law limiting riparian rights to a reasonable use would be in the best interests of the welfare of all the people.

Make Safety Education Pay More Dividends

INDUSTRIAL accidents in California account for the death of 600 and the permanent injury of 1,600 workers in one year. Striking figures, these! However, they represent only the average industrial casualties in a state which ranks well up for its safety measures. Monetary costs amount to nearly $11,000,000 per year expended for compensation and medical benefits and three times that amount is lost to industry during the time injured workers are not on the job. Of this listing of accidents only 15 per cent is attributable to defective guarding and poor safety devices, while 85 per cent results from a lack of safety education and training among the employees themselves. Six hundred funerals and 1,600 hospital cases in one state in one working year certainly presents an argument that should win the most conservative to an active campaign of safety education. The worker's loss is industry's loss just as the reverse is true. Therefore the expense of teaching employees to "think safety" is an investment that is bound to pay appreciable dividends.

The "Flash-in-the-Pan" as a Good Credit Risk for Jobbers

BUSINESS consists of barter and trade. There is also another element, namely, that the transaction is not complete if the bill is not paid.

America is a land in which a goodly number of ambitious young men feel the urge to go into business for themselves. Our magazines are filled with tales of the dramatic achievements of captains of industry who started with nothing and, facing tremendous odds, have overcome them in many cases by snatching victory from the jaws of defeat. It is an inspiring picture, of the very essence of America, and it is to be hoped the practice will continue until the end of time.

The story of those who fall by the wayside, however, is seldom told, except in the drab proceedings of the bankruptcy court and the minutes of the Board of Trade. The record of the impatient young man, full of the impetuosity of youth, tired of the old fogyism of his elders, willing to take a chance, is there in terms of assets and liabilities shown with the colorless monotony of the accountant's report.

Jobber competition is responsible for no small number, or is at least a contributing cause in the quick demise, of these "flash-in-the-pan" ventures within the electrical industry. The extension of a line of credit where there is no real reason for such consideration is the first step on the downward path. In the end it means a red-ink entry on the books of the jobber; for the neophyte in the electrical business it means the necessity for a fresh start following a failure that was at least avoidable.

Business nowadays is complex and full of pitfalls, especially among merchants and contractors. Even those who have latent talent in these two branches of buisness need cultivation, practice, experience, and friendly counsel from the elder brothers who have weathered the storm themselves. The observance of sound business practice in the way of extension of credits would go a long way toward stabilizing the industry and prove of the greatest benefit to the young man who is attempting to go into business on the proverbial "shoe-string" basis without realizing what cold, hard realities he is up against.

This should not be construed as advocating the desirability of a "thumbs down" attitude toward youth and ambition, but rather as a warning that to spare the rod and spoil the child is bad business all around, and overindulgence in the matter of credits is an ill-advised piece of business gambling. There will be but few winners and many losers in such a game.

Losses due to injudicious extension of credits are a tax upon the entire industry. They increase the overhead, the cost of selling, and in consequence the cost to the consumer, and lessen the returns to invested capital. It should not be too difficult for the young man to go into the electrical business; neither should it be too easy.

Appliance Advertising and the "Fluffy Ruffles" Woman

A GENTLEMAN of the advertising profession who seems to know human nature very well sat looking over the advertisements in a number of large national magazines that circulate in the home. Since the subject under discussion was electrical advertising, his comment focused itself upon the general tendencies displayed in advertising of electrical appliances. The gist of his remarks was about as follows:

"Manufacturers of electrical appliances should be careful not to overdo the 'fluffy ruffles' type of woman in their advertising, the woman who is off to the country club or to the bridge tea and who blithely leaves the dishes in the dishwasher and the dinner in the oven or fireless cooker. There are too many advertisements which would lead one to believe that the woman of the home may throw the clothes into the washing machine and jump into her roadster for a spin to the country club and a round of golf or a rubber of bridge, coming back to find her washing done, ironed and put away in the proper bureau drawer, all by electricity. Electricity will do many things, but that is a bit too much to expect of it just now.

"By directing the appeal to this type of woman the manufacturer is making his product, unconsciously perhaps, a class product. He is leaving room for the reaction that such and such an appliance is all very beautiful and desirable, 'but, dear me, it is not in our class!'

"Such a reaction limits the market possibilities for that appliance. The washing machine is chiefly a tool of production, applied to the home. It does not perform magic, though it does lessen labor. The appeal might be a hundredfold more effective if it were based upon usefulness and labor-saving. Moreover, its appeal should not be one limited to the woman of the family but to the man of the family as well.

"Laundries are advertising, 'Keep Your Wife Young,' and by doing so are appealing to the entire family

group. The electric washer, the electric range, in fact every electric appliance, has a group appeal. If the advertiser limits his attack to the country-club, fly-about wife, he is apt to find that she has no use for a washing machine anyway, that she eats most of her meals out, and that, as far as home is concerned, it is less a place in which to utilize electricity to lighten labor than it is a place to park the evening gown after the theatre and from which to leave at the earliest moment after waking up in the afternoon."

There is much to weigh carefully in these comments. If electrical advertising has been directed erroneously, certainly it should be examined and revised. It is true that the appeal to leisure is an universal one and that if it is not within the grasp of every housewife it is none the less something which she desires. But it is also true that electrical advertising must not be class advertising, limited to a certain stratum of the buying public. Chiefly, electricity offers to replace physical, back-breaking labor with cheap electrical energy. It offers the housewife a group of mechanical servants who do their work well and do not talk back. It gives the manual worker a few more pairs of electrical hands with which to do the necessary work of the day's routine.

Perhaps those responsible for electrical advertising may learn something from this critic's remarks.

The Business of Co-operation

MOVEMENTS of a co-operative nature within industries are becoming more and more numerous. This is especially true of the electrical industry, in fact so much so that voices are beginning to be heard questioning or even protesting against the rapid increase in associations on the ground that they are consumers of time and money in quantities disproportionate to the amount of good accomplished.

Leaders in a co-operative association work do indeed find it most difficult to translate results into concrete terms. In most cases the whole association structure is the reverse of a business organization in that the paid staff is merely a skeleton organization whose duties are largely clerical and administrative, while the bulk of such work as is done rests on the shoulders of men who do something else for a livelihood. Volunteer labor is not efficient, as far as the volunteer part of it is concerned; time spent on association work must be purloined from the bread-and-butter job, generally at some sacrifice of the latter.

Nevertheless, association work is, or should be, germane to the occupation of the man who undertakes it. The broadening effect of contact with one's fellows on a common ground, the interchange of ideas, consideration of the larger phases of the industry, make of the man a better, more intelligent worker. They take him out of the mental rut induced by being glued to a desk and absorbed by the details of his own job.

Another item of even greater importance is the creation of solidarity within the industry as a whole that cannot be accomplished except through the many personal contacts brought about by association meetings. California is especially fortunate in this respect, for the cordial good feeling existing throughout all branches of the industry has been created solely through association contacts, and many of the more thoughtful leaders believe this to be of such importance as alone to justify all the time and effort that have been expended in bringing it about.

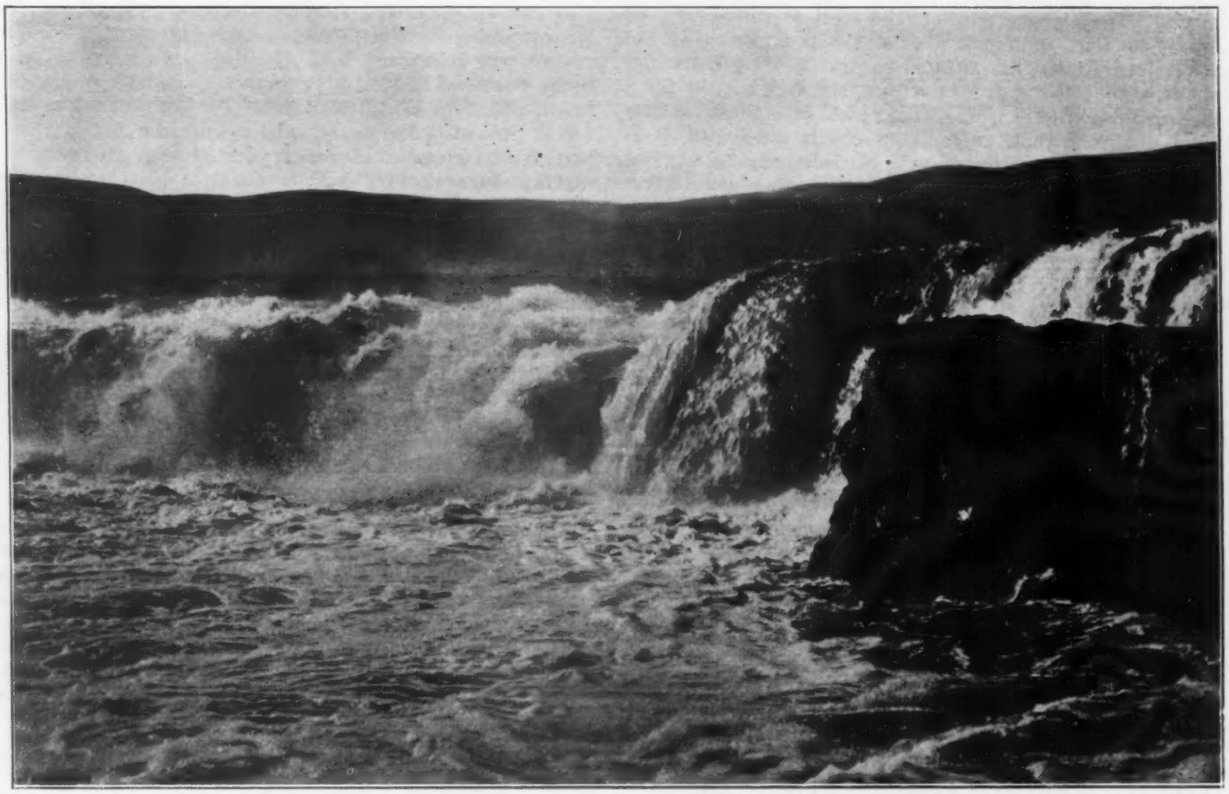
As to the money cost, associations as a rule will spend all they can get and, like Oliver Twist, ask for more. Association financing often is approached from the wrong angle, as when full-time employees of the association are entrusted with the duty of providing adequate finances, instead of a finance committee of unpaid board members being responsible for the work. The latter is obviously the better plan; with the former, half to three-quarters of the employees' time is spent in soliciting subscriptions rather than in performing the work for which the association is formed. If the paid staff concerned itself solely with administrative and promotional work, leaving the unpaid directorate to provide the funds and keep a close check on their disbursement, a better job undoubtedly would be done, and for considerably less money. Association work is useful, constructive, and plays a definite part in the welfare of the industry, but it could be handled better and at less cost.

Industry Owes Debt to Samuel M. Kennedy

NEWS OF the retirement from active work of Samuel M. Kennedy, vice-president of the Southern California Edison Company, is of more than passing interest to the electrical industry. Some months ago Mr. Kennedy suffered a painful accident that has incapacitated him physically ever since, a circumstance that was heralded with universal regret not merely by his associates but by the men of the industry as a whole. Always an apostle of the golden rule, Mr. Kennedy was one of the first among utility executives who sensed the need for better public relations and was able to put into effect many simple precepts that proved potent as builders of good-will. His writings on the subject, notably his book, "Winning the Public," have influenced to a marked extent the trend toward the promotion of better public relations in utility operation throughout the entire country. As a pioneer in his special field of endeavor the utilities owe much to Samuel M. Kennedy, and will continue to react to the influence of his teachings for many years to come.

Let Taxpayers Make This Study

SAN FRANCISCO proposes to remove its rapidly expanding group of municipal utilities from the political arena through the organization of a public utility commission. As an initial step a resolution has been passed instructing a committee to study the operation of municipal utilities in various large cities of the country where commission administration and management is in effect. The only drawback to the resolution is that the committee authorized is political in its makeup, having been drawn from the present Board of Supervisors. No soothsayer is required to prophesy the text of this committee's report. But conceivably, what a totally different set of recommendations might be made to the voters if the committee were to be composed of a group of business men, preferably drawn from the ranks of the largest taxpayers in the city! Such a group would receive an enlightening education in the intricacies of political utility operation were it to take as advisers on its tour of inspection a competent accountant and an equally competent engineer. Perhaps it would be able to discover the reasons why per capita tax rates in Seattle, Los Angeles and Cleveland are the highest for cities in their class. San Francisco's determination to study municipal utility operation in other cities is little more than a pretty gesture under present circumstances.



Two Western Sources of Potential Hydro Power

SIXTY-NINE per cent of the potential water power resources of the United States is in the eleven Western states, and the two major sources of potential power in this territory are the Columbia and Colorado Rivers. On a 90 per cent time basis the former stream will develop approximately 750,000 kw. without storage. Power possibilities of the Colorado River are conservatively set at 3,500,000 kw. on a 90 per cent basis. Utilization of the power resources of the Columbia, because few of its sites will permit a step-by-step development in small units, awaits the surety of a large market. The attitude of Arizona with respect to a seven-state compact continues to hold back flood control, irrigation and power development on the Colorado River.

Lake Cushman Dam, City of Tacoma Lighting Department.

Review of Western Hydro and Steam Construction Projects

ALTHOUGH central station construction during 1926 only accounted for the addition of 227,105 kva. to the installed capacity of the eleven Western states, the program of work under way was the largest in the history of the industry and will be reflected in the increases in capacity for 1927 and 1928. The 1926 additions, comprising 116,855 kva. in hydroelectric capacity and 110,250 kva. in steam stations, compares to 402,125 kva. for 1925, and brings the total for the West to 3,595,828 kva. The past year might be said to be the first in which the power companies have caught up with the demands imposed upon them following the war. However, the lull is but temporary as is indicated by the plans for 1927 and 1928. The 1926 expenditures are estimated to have been approximately $150,000,000, the greater portion of which was spent for transmission and distribution facilities.

Based upon present indications additions to the installed capacity during 1927 will be approximately 320,093 kva. of which 266,343 kva. will be in hydro plants and 53,750 in steam. It is likely that the increase in 1928 will exceed this figure. Increases to the installed capacity during the period 1924-1927 inclusive will amount to 1,331,046 kva. or an average of 333,011 kva. per year. Of this amount 941,046 kva. will have been contributed by hydro and 385,000 kva. by steam. The ratio of hydro to steam will be approximately 2.5 to one.

Hydro capacity added during the year resulted from the completion of the Lake Cushman project of the City of Tacoma Light Department with an installed capacity of 60,000 kva., the Exchequer plant of the Merced Irrigation District with 31,250 kva. and the Mormon Flats plant of the Salt River Valley Water Users' Association in Arizona with 17,000 kva. Lake Cushman is the initial development in a project that will ultimately consist of two plants with a total capacity of 187,500 kw. The first plant claims as its chief distinction the greatest reservoir capacity per cubic yard of concrete in its dam of any project in America. With a 285-ft. dam the plant has 450,000 acre-ft. of storage available.

The Exchequer plant generates by-product power as an adjunct to a $12,000,000 irrigation project. (See Journal of Electricity, Oct. 1, 1926, p. 233). The same is true of the Mormon Flats plant on the Salt River in Arizona.

Additional units in Station L of the Portland Electric Power Company, in the Valmont plant of the Public Service Company of Colorado, and in the Long Beach No. 3 plant of the Southern California Edison Company accounted for the increase in steam capacity during the year. The Long Beach unit with a capacity of 55,555 kva. is the largest to be installed west of the Mississippi River while that at the Valmont plant is the largest unit where powdered lignite coal is burned.

Hydro Development in 1927

In all sixteen hydro plants, of which nine will be entirely new and seven will either be reconstructed or have additional units installed, will be completed during 1927. The most important will be the Balch plant of the San Joaquin Light & Power Corporation where 33,000 kva. will be developed under a head of 2,381 ft., the highest as yet in America. Another important project will be the Cutler plant of the Utah Power & Light Company. This plant is the lowest in the Bear River chain and will add 33,660 kva. to the system of that company. The Horse Mesa plant of the Salt River Valley Water Users' Association with 33,300 kva. and the Melones plant of the Pacific Gas and Electric Company with 27,000 kva. will be two plants where power generation is secondary to irrigation. The Chelan project of The Washington Water Power Company will be completed to the extent of one unit with a capacity of 30,000 kva. Since the accompanying table

Some Additions to Hydroelectric Generating Pl

No.	COMPANY	PLANT	LOCATION	DAMS			CANALS AND TUNNELS			PENSTOCKS			HEAD (Ft.)	
				Type	Reservoir Capacity (Acre-ft.)	Height (Ft.)	Type	Dia. (Ft.)	Length (Ft.)	Dia.	Length (Ft.)	Type	Static	Effective
(1)	British Columbia Electric Railway Company, Ltd.	Alouette	35 miles east of Vancouver, B.C.	Earth Fill	170,000	63	Tunnel	12x16	3,550	13′ 12′	.....	Concr. Rivtd.	97–166	133 Av.
(2)	British Columbia Electric Railway Company, Ltd.	Bridge River	Seton Lake, B.C.	.....	.....	.....	Tunnel	13	13,200	.....	2,100	.....	1,200	1,150
(3)	City of Seattle Lighting Department	Diablo	Skagit River	Concr. Arch	100,000	365	Tunnel	20.5	1,700	.....	.....	.....	320	310
(4)	Northwestern Power and Light Company	Glines Canyon	Elwha River near Port Angeles, W.	Concr. Arch	40,000	200	Pressure Tunnel	13x14	575	11.5′ 10′	450	Rivtd.	180	180
(5)	City of Tacoma Light Department	Cushman No. 1	Lake Cushman, Wash.	Constant Angle Arch	450,000	285	Concrtd. Tunnel	17	800	10′	80	Rivtd.	260	231–120
(6)	City of Tacoma Light Department	Potlatch	Hoods Canal, Wash.	Concr. Arch	.....	185	Tunnel	16	11,000	8′ 6′	2,000	.....	450	440
(7)	City of Aberdeen	Wynooche	Wynooche River, Wash.	Arch	.....	240	.....	.....	.....	.....	.....	.....	.....	.....
(8)	Chelan Electric Company (Sub. Washington Water Power Co.)	Chelan	Chelan Lake and River, Wash.	Gravity	640,000	40	Pressure Tunnel	14	10,529	8′ 10″	108	.....	415	377
(9)	Inland Power & Light Company (Sub. Pacific Power & Light Co.)	Lewiston	Lewiston, Ida.	Concr. Spillway	550	45	None	.....	.....	.....	None	.....	20–35	20–35
(10)	Idaho Power Company	East Side 3rd and 4th Units	American Falls, Ida.	†	†	†	.....	None	.....	.....	None	.....	.....	48
(11)	U. S. Bureau of Reclamation	Minadoka 6th Unit	Near Rupert, Ida.	†	†	†	.....	None	.....	10′	46	Rivtd.	47	46
(12)	Great Falls Power Company (Sub. Montana Power Company)	Black Eagle	Great Falls, Mont.	Concr.	1,000	10	Canal	90x25	420	15′	40	Rivtd.	51	50
(13)	Utah Power & Light Company	Cutler	Bear River, Utah	Concr. Arch	17,000	109	Steel Pipe	18	1,100	14′	117	Rivtd.	126	124
(14)	Dixie Power Company	No. 3	Washington County, Utah	Earth Fill	1,580	47	Canal Wood Pipe	3x10 24″–42″	30,000 15,600	26″–30″	2,051	Weld.	411	390
(15)	Salt River Valley Water Users' Association	Horse Mesa	Salt River, Ariz.	Arch	300,000	300	.....	None	.....	10′	350	Rivtd.	264	264
(16)	Salt River Valley Water Users' Association	Mormon Flats	Salt River, Ariz.	Arch	90,000	150	.....	None	.....	8′	50	Rivtd.	70–150	70–150
(17)	Pacific Gas and Electric Company	Melones	Stanislaus River, Calif.	Concr. Arch	112,500	210	Pressure Tunnel	12	4,800	8.5′ 7.5′	2–150	Rivtd.	235	225 Var.
(18)	Pacific Gas and Electric Company	Spaulding No. 1	Nevada County, Calif.	†	†	†	Tunnel	8′ 8″	950	.....	None	.....	197	190 Var.
(19)	Pacific Gas and Electric Company	Spaulding No. 2	Nevada County, Calif.	†	†	†	Tunnel	8′ 8″	839	48″	250	Rivtd.	344	335 Var.
(20)	Pacific Gas and Electric Company	Spaulding No. 3	Nevada County, Calif.	.....	None	.....	None	.....	.....	66″	1,650	Rivtd.	304	289
(21)	Pacific Gas and Electric Company	Drum 4th Unit	Nevada County, Calif.	†	†	†	†	†	†	72″ 52″	6,275	Rivtd.	1,375	1,280
(22)	Pacific Gas and Electric Company	Pit No. 4	Pit River, Calif.	Arch Diversion	1,550	130	Concrtd. Tunnel	19	.....	.....	.....	.....	.....	.....
(23)	Feather River Power Company	Bucks Creek	Feather River, Calif.	Rock Fill 2-Arch	103,000	115 85	Pressure Tunnels	6x8 8x8	5,700 9,670	54″ 36″	4,715	Rivtd. Weld.	2,548	2,368
(24)	American River Water & Power Company.	American River No. 1	Middle Fk. American River, Calif.	Constant Angle Arch	100,000	200	Canal	.....	55,000	.....	.....	.....	2,000	.....
(25)	American River Water & Power Company	American River No. 2	Middle Fk. American River, Calif.	Diversion	.....	.....	Canal Tunnel	....	48,000 17,500	.....	.....	.....	1,750	.....
(26)	American River Hydroelectric Company	Folsom	Folsom, Calif.	Gravity	325,000	185	Tunnel	20x20	2,000	.....	.....	Rivtd.	.....	225
(27)	Sacramento Municipal Utility District	Big Bend	Silver Creek, Calif.	Arch	45,000	130	.....	.....	.....	.....	.....	.....	1,627	.....
(28)	San Joaquin Light & Power Corporation	.....	Kings River, Calif.	Concrete Diversion	100	50	Tunnel	12x12	19,600	54″ 32″	4,842	Weld. Rivtd.	2,381	2,343
(29)	Merced Irrigation District	Exchequer	Merced River, Calif.	Constant Angle Arch	280,000	330	.....	None	.....	96″	200	Rivtd.	300–140	260 Av.
(30)	Turlock and Modesto Irrigation District	Don Pedro 3rd and 4th Units	†	†	†	†	.....	.....	.....	.....	.....	.....	.....	Var.	130–280
(31)	Southern California EdisonCompany	Big Creek 2A	Fresno County, Calif.	Gravity	138,000	188	Tunnel	8x11	13,600	96″ 34″	6,800	Rivtd. Weld. Forged	2,420	2,290
(32)	Los Angeles Bureau of Power & Light	Haiwee	Inyo County, Calif.	Earth Fill	63,000	.....	.....	.....	.....	8′ 8″ 7′ 0″	9,600	Rivtd.	190	155 Normal
(33)	U. S. Bureau of Reclamation	Siphon Drop	Imperial County, Calif.	.....	.....	.....	Canal	.....	.....	.....	.....	.....	10–14	10

PRINT IN BINDING

Plants in the Eleven Western States 1926-1927

PRIME MOVERS			GENERATING UNITS			PLANT CAPACITY (kw.)		TRANSFORMERS	TRANSMISSION LINES			PRESENT STAGE OF DEVELOPMENT	ESTIMATED COST	No.
No.	Capacity (hp.)	Maker	No.	Capacity (kva)	Maker	Present or Proposed	Ultimate		Length (Miles)	Voltage (kv.)	Type			
1	12,500	E. E.*	1	10,000	E. E.	9,000	9,000	3-3,000 Kva.	10.5	60	Wood Pole	To be completed, 1927	$2,250,000	(1)
2	27,000	.....	2	22,500	.....	40,000	520,000	.....	130	165	.....	Preliminary work under way	.....	(2)
.....	40,000	.....	.....	30,000	.....	.....	240,000	.....	120	165	.....	Dam to be built in 1927	3,400,000	(3)
1	17,500	Pelt.	1	13,333	G. E.	10,000	10,000	3-4,500 Kva. G. E. 6,600/66,000 volt	7	66	Wood Pole	To be completed March, 1927	1,500,000	(4)
2	25,000	A.-C.	2	30,000	A.-C.	40,000	120,000	6-10,000 Kva. A.-C. 13,200/110,000 volt	44	110	Wood Pole	Completed March, 1926	5,250,000	(5)
3	30,000	.....	.....	.....	.....	.....	67,500	.....	.....	.....	.....	Proposed	5,000,000	(6)
.....	.....	.....	.....	.....	.....	21,000	.....	.....	30	.....	.....	Bonds voted	2,700,000	(7)
1	34,000	I. P. M.	1	30,000	G. E.	24,000	96,000	4-10,000 Kva. West. 11,000/110,000 volt	.....	.....	.....	Construction started 1926	10,000,000	(8)
2	7,000	S. M. S.	2	6,250	A.-C.	10,000	10,000	2-6,250 Kva. G.E.	None	.....	.....	To be completed 1927	2,000,000	(9)
2	9,000	A.-C.	2	7,500	A.-C.	27,000	27,000	4-11,250 Kva. G. E.	82	132	Wood Pole	Construction started December, 1926	800,000	(10)
1	3,500	N. N. S.	1	3,000	A.-C.	10,000	10,000	4-1,000 Kva.	.....	None	.....	To be completed June, 1927	230,000	(11)
3	9,000	S. M. S.	3	7,000	A.-C.	16,800	16,800	†	†	†	†	45 per cent complete	2,000,000	(12)
2	21,500	I. P. M.	2	18,830	G. E.	30,000	30,000	3-8,333 Kva. G. E. 6,600/130,000 volt	80	130	.....	Completed, Jan., 1927	5,500,000	(13)
1	1,200	.....	1	800	G. E.	2,300	4,400	4-250 Kva. G. E.	4.5	33	Wood Pole	To be completed Apr. 1, 1927	150,000	(14)
3	15,280	S. M. S.	3	11,100	G. E.	34,000	34,000	10-3,700 Kva. G. E. 6,600/110,000 volt	4	110	Steel Tower	To be completed March, 1927	3,500,000	(15)
2	10,000	S. M. S	2	8,500	West.	14,000	14,000	4-3,000 Kva. West. 11,000/110,000 volt	1	110	.....	Completed, May, 1926	400,000	(16)
2	17,000	S. M. S.	2	13,500	West.	20,000	20,000	4-9,000 Kva. West.	7.5	104	Steel Tower	To be completed May 1, 1927	2,523,000	(17)
1	10,000	Pelt.	1	8,000	G. E.	6,400	6,400	4-4,000 Kva. A.-C. 2,300/60,000 volt	.....	60	Wood Pole	To be completed late in 1927	471,000	(18)
1	5,300	Pelt.	1	3,750	G. E.	3,000	3,000	None	.....	None	.....	Will be completed late in 1927	203,000	(19)
1	8,000	Pelt.	1	7,000	West.	5,600	5,600	4-2,500 Kva. A.-C. 6,600/60,000 volt	2	60	Wood Pole	To be completed early in 1928	535,000	(20)
1	18,000	.....	1	15,000	.....	42,000	42,000	3-5,500 Kva. 6,600/125,000 volt	†	†	†	To be completed late in 1927	1,329,000	(21)
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Dam completed	14,500,000	(22)
2	30,000	Pelt.	2	25,000	G. E.	40,000	40,000	7-8,333 Kva. G. E. 11,000/240,000 volt	108	220	Steel Tower	To be completed Jan. 1, 1928	6,500,000	(23)
2	12,500	.....	2	10,000	.....	20,000	20,000	.....	.....	.....	.....	Construction to start 1927	See No. 2 Plant	(24)
2	12,500	.....	2	10,000	.....	20,000	20,000	.....	.....	.....	.....	Construction to start 1927	8,250,000 both plants	(25)
	Being Designed			Being Designed		30,000	30,000	To be furnished by P. G. and E. Co. which has contracted for power.				Construction to start 1927	8,000,000	(26)
.....	.....	.....	.....	.....	.....	30,000	.....	.....	.....	.....	.....	Proposed	.....	(27)
1	40,000	A.-C.	1	33,000	G. E.	31,000	124,000	4-11,000 Kva. G. E. 13,200/132,000 volt	39	132	Steel Tower	Completed January, 1927	3,764,345	(28)
2	24,500	I. P. M.	2	15,625	West.	30,000	30,000	3-10,400 Kva. G. E. 6,600/120,000 volt	20	110	Steel Tower	Completed May, 1926	12,000,000	(29)
2	10,000	.....	2	7,500 kw.	.....	30,000	30,000	.....	.....	.....	.....	To be installed 1927	755,000	(30)
2	56,000	A.-C. Pelt.	2	45,000	West.	80,000	80,000	4-30,000 Kva. G. E.	6.5	220	Steel Tower	To be completed 1928	18,000,000	(31)
2	3,400	S. M. S.	2	3,500	G. E.	5,600	.....	4-2,333 Kva. G. E.	2.5	33	Wood Pole	Construction started Dec. 1, 1926	752,000	(32)
2	580	S. M. S.	2	1,000	West.	1,000	1,400	4-667 Kva.	11	33	Wood Pole	Completed 1926	250,000	(33)

†Existing structures will be used.

*Abbreviations used are: E. E., English Electric Company; A.-C., Allis-Chalmers Manufacturing Company; G. E., General Electric Company; West., Westinghouse Electric & Manufacturing Company; Pelt., Pelton Water Wheel Company; I. P. M., I. P. Morris Department William Cramp & Sons Ship & Engine Building Company; W. S. M., Wellman-Seaver-Morgan Company; S. M. S., S. Morgan Smith Company; N. N. S., Newport News Shipbuilding & Drydock Company

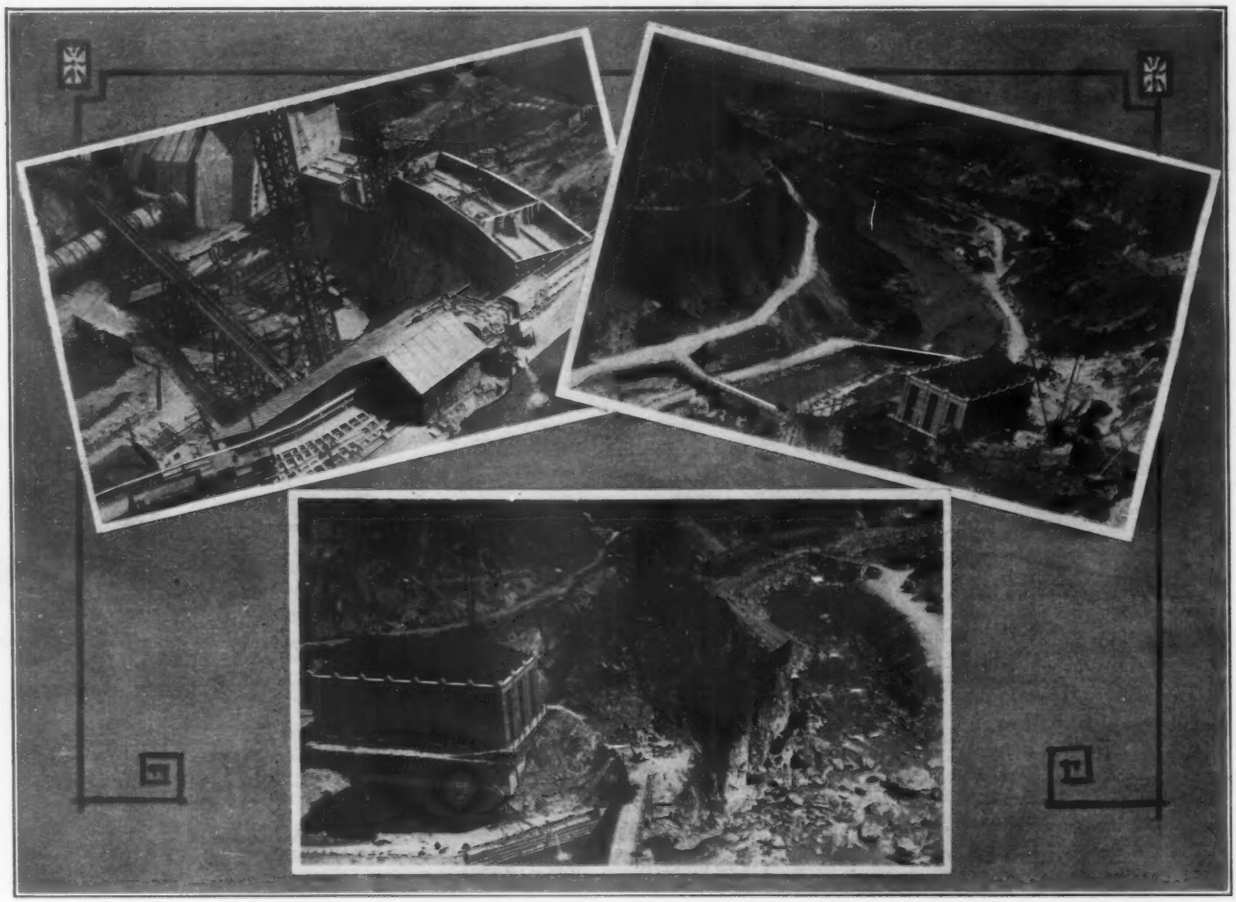
Some Additions to Steam Electric Generating

	COMPANY	PLANT	LOCATION	BOILERS				FUEL	PRIME MOVERS		
				No.	Type	Capacity (hp.)	Maker		No.	Capacity (hp.)	Maker
(1)	Portland Electric Power Company	Station L (Addt'l Unit)	Portland, Ore.	No Addt'l	.....	.....	.....	Hogged Fuel	1	27,700	G. E.
(2)	Public Service Company of Colorado	Valmont (2nd Unit)	Boulder, Colo.	No Addt'l	.....	.....	.....	Pulverized Coal	1	30,000	G. E.
(3)	Albuquerque Gas & Electric Company	Bernalillo	Bernalillo, N. M.	1	Water Tube	901	Springfield	Wood Refuse	1	5,000	West.
(4)	Southern California Edison Company	Long Beach No. 2	Long Beach, Calif.	7	Water Tube	1,500	Llewellyn	Oil and Gas	1	75,000	G. E.
(5)	Southern California Edison Company	Long Beach No. 3	Long Beach, Calif.	3	Cross Drum Stgt. Tube	.....	B. & W.	Oil and Gas	1	125,000	G. E.
(6)	Pasadena Municipal Light & Power Department	Glenarm Street	Pasadena, Calif.	No Add'l	.....	.....	.....	Oil and Gas	1	20,000	.....
(7)	Los Angeles Bureau of Power & Light	Harbor	Los Angeles, Calif.	3	Water Tube	.....	.....	Oil and Gas	1	36,000	.....
(8)	Southern Sierras Power Company	San Bernardino	San Bernardino, Calif.	No Add'l	.....	.....	.....	Oil	1	6,700	A.-C.
(9)	San Diego Consolidated Gas & Electric Company	Station B	San Diego, Calif.	2	.....	1,225	B. & W.	Oil	1	20,000	G. E.

†Abbreviations:—G. E., General Electric Company; B. & W., Babcock & Wilcox Company; Con., Connelly Boiler Company; West., Westinghouse Electric & Manufacturing Company; A.-C., Allis-Chalmers Manufacturing Company; Llewellyn, Llewellyn Iron Works.

has been compiled an additional unit for this plant has been ordered and will be installed some time in 1928.

A unique development in Montana is the reconstruction of the Black Eagle plant of the Great Falls Power Company (a subsidiary of the Montana Power Company) where three 7,000-kva. propeller-type units will be installed. These will be the largest units of this type ever constructed and their operation will be watched with interest. Another unique development is the Glines Canyon plant being built for the Northwestern Power & Manufacturing Company by Thebo, Starr & Anderton on the Olympic Peninsula in Wash-



An Intermountain Hydro Project

Three views of the 30,000-kw. Cutler development of the Utah Power & Light Company on the Bear River.

Stations in the Eleven Western States, 1926-1927

GENERATORS			PLANT CAPACITY (kw.)		TRANSFORMERS	TRANSMISSION LINE			PRESENT STATUS	ESTIMATED COST	
No.	Capacity (Kva.)	Maker	Present or Proposed	Ultimate		Length (Mi.)	Voltage (Kv.)	Type			
1	25,000	G. E.	42,500	.....	No Addtl.	No Addtl.	.....	.....	Completed Aug. 1, 1926	$600,000	(1)
1	31,250	G. E.	4 ,000	100,000	No Addtl.	No Addtl.	.....	.....	Completed, 1926	626,893	(2)
1	3,750	West.	3,000	.....	3-1,000 Kva. West. 2 00–44,000 volt	17	44	Wood Pole	To be completed early in 1927	225,000	(3)
1	55,555	G. E.	145,000	145,000	4-20,000 Kva. G. E.	No Addtl.	.....	.....	Completed July 10, 1926	5,650,000	(4)
1	99,999	G. E.	90,000	720,000	4-33,333 Kva. G. E.	Not Determined	.....	.....	To be completed February, 1928	7,000,000	(5)
1	17,500	.....	16,000	31,000	.....	.....	.....	.....	Proposed	600,000	(6)
1	31,250	.....	30,000	.....	3-10,500 Kva.	.....	.....	.....	Proposed	.....	(7)
1	5,000	A.-C.	5,000	10,000	No Addtl.	.....	.....	.....	Completed 1926	.....	(8)
1	18,750	G. E.	36,000	60,000	6-2,000 Kva. G. E.	.....	.....	.....	Completed Jan. 1, 1927	2,000,000	(9)

ington. This will be a fully automatic station with a capacity of 13,333 kva. and will be the largest of its type every attempted.

The tendency toward converting smaller plants in a chain to either full or semi-automatic types is becoming more and more marked as indicated by the completion of the Ruxton plant of the City of Colorado Springs Lighting Department. This station generates 1,250 kva. under a head of 1,160 ft. The Pacific Gas and Electric Company has announced that a chain of automatic plants will be constructed below the Spaulding dam by rebuilding two present generating stations and constructing a third. Details on these plants are given in the accompanying table. The Glines Canyon plant has already been mentioned.

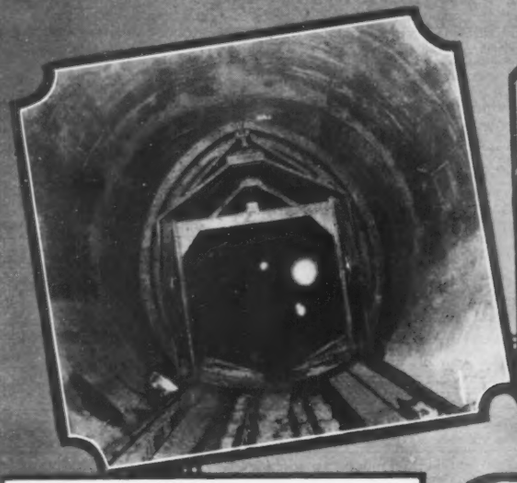
Laying a portion of the 4,842-ft. penstock on the Balch project of the San Joaquin Light & Power Corporation.

Steam plant construction during 1927 will consist of the installation of an additional unit in Station B of the San Diego Consolidated Gas & Electric Company, a new plant in the Harbor district to be built by the Los Angeles Bureau of Power and Light and a small unit at Bernalillo, Ariz., for the Albuquerque Gas & Electric Company. There is a possibility that the City of Pasadena Lighting Department will install an additional unit in its Glenarm steam plant.

Construction under way during the year will include the Big Creek 2-A plant of the Southern California Edison Company with a capacity of 90,000 kva. in two units under a head of 2,420 ft. Double-overhung impulse wheels with a capacity of 56,000 hp. will be used in this plant. A second high head plant that will be completed late in 1927 or more likely early in 1928 will be the Bucks Creek project of the Feather River Power Company where 50,000 kva. will be developed under a head of 2,548 ft. which will be the highest in the United States. Work will also proceed on the Bridge River development of the British Columbia Electric Railway Company, Ltd., the Diablo plant of the City of Seattle Lighting Department and the Potlatch project of the City of Tacoma in the Pacific Northwest.

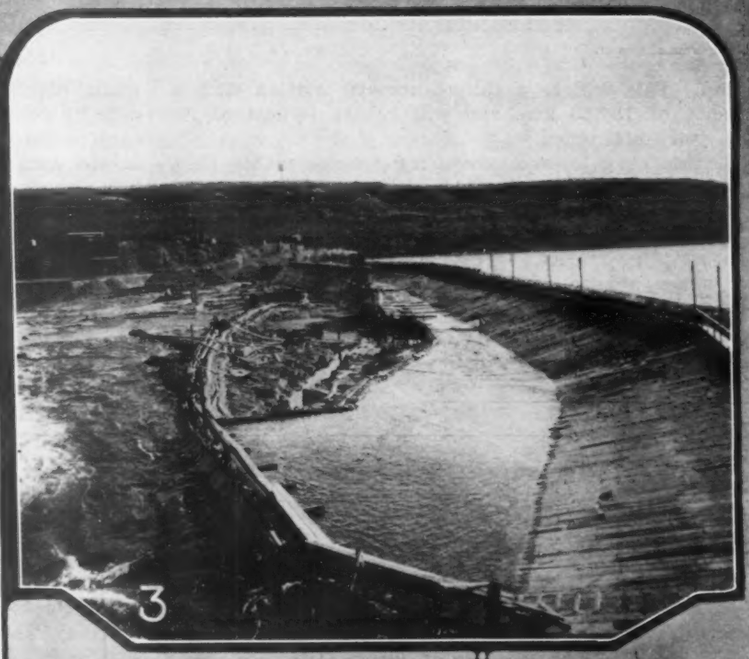
Two hydroelectric projects have been announced since the compilation of the accompanying table. The California Oregon Power Company is to begin construction immediately on a 40,000-hp. plant at Prospect, Ore., on the Rogue River, to cost approximately $3,000,000. The United States Indian Irrigation Service has also announced that a 10,000-hp. plant will be constructed in conjunction with the Coolidge dam being built on the Gila River at San Carlos, Ariz. This will be a multiple dome dam and is described on another page of this issue.

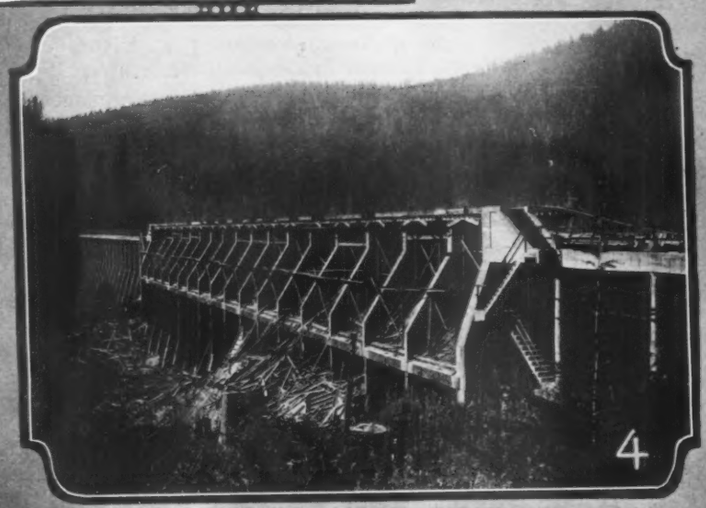
A most important announcement with relation to steam development has been made by the Southern California Edison Company. Extension of the Long Beach plants with the addition of a third station with an ultimate capacity of 720,000 kw. is to be made immediately. The initial installation will consist of one unit with a capacity of 90,000 kw. This unit will be completed early in 1928 and since the compilation of the



Some Northwest Hydro Power Projects

THE Washington Water Power Company through its subsidiary, the Chelan Electric Company, is progressing on the Chelan project. The interior of the 10,529-ft. concrete lined tunnel is shown in (1). The spillway section of the Allouette dam of the British Columbia Electric Railway Company, Ltd., is shown in (2). One of the most unique developments is the Black Eagle project of the Great Falls Power Company where three 9,000-hp. propeller-type turbines are being installed. Construction work on the dam at this site is shown in (3). A section of the diversion dam on the new Bridge River project of the B. C. Electric Railway Company is shown in (4) while (5) shows the draft tube form for the Allouette plant of the same company being erected on a barge from which it will be transferred to the power plant.





accompanying table on steam development a second unit has been ordered and will be in service in 1929. With the present Long Beach No. 1 and No. 2 plants, the ultimate capacity of this particular development will be approximately 1,000,000 kva.

During the past year considerable hydraulic work definitely related to power development has been under way. The Great Western Power Company has completed the raising of Big Meadows dam at Lake Almanor giving this company the largest artificial power reservoir in the world. Lake Almanor now has a capacity of 1,300,000 acre-ft. The work was done by The Foundation Company at an approximate cost of $2,000,000. Water storage is now provided for the ultimate chain of hydro plants that Great Western will have along the Feather River.

The Southern California Edison Company has continued active construction at Big Creek. During 1926 the Florence Lake dam was completed providing additional storage above Huntington Lake. Work was started on the Mono-Bear diversion. Water from Mono and Bear Creeks is to be carried across the South Fork of the San Joaquin through tunnels and pipes into the Florence Lake tunnel. This work is to be completed at the end of 1927 and will cost approximately $6,000,000.

By raising the height of Fordyce dam to care for additional storage being provided by the Nevada Irrigation District at Bowman, the Pacific Gas and Electric Company has developed additional water supplies for its Bear River plants.

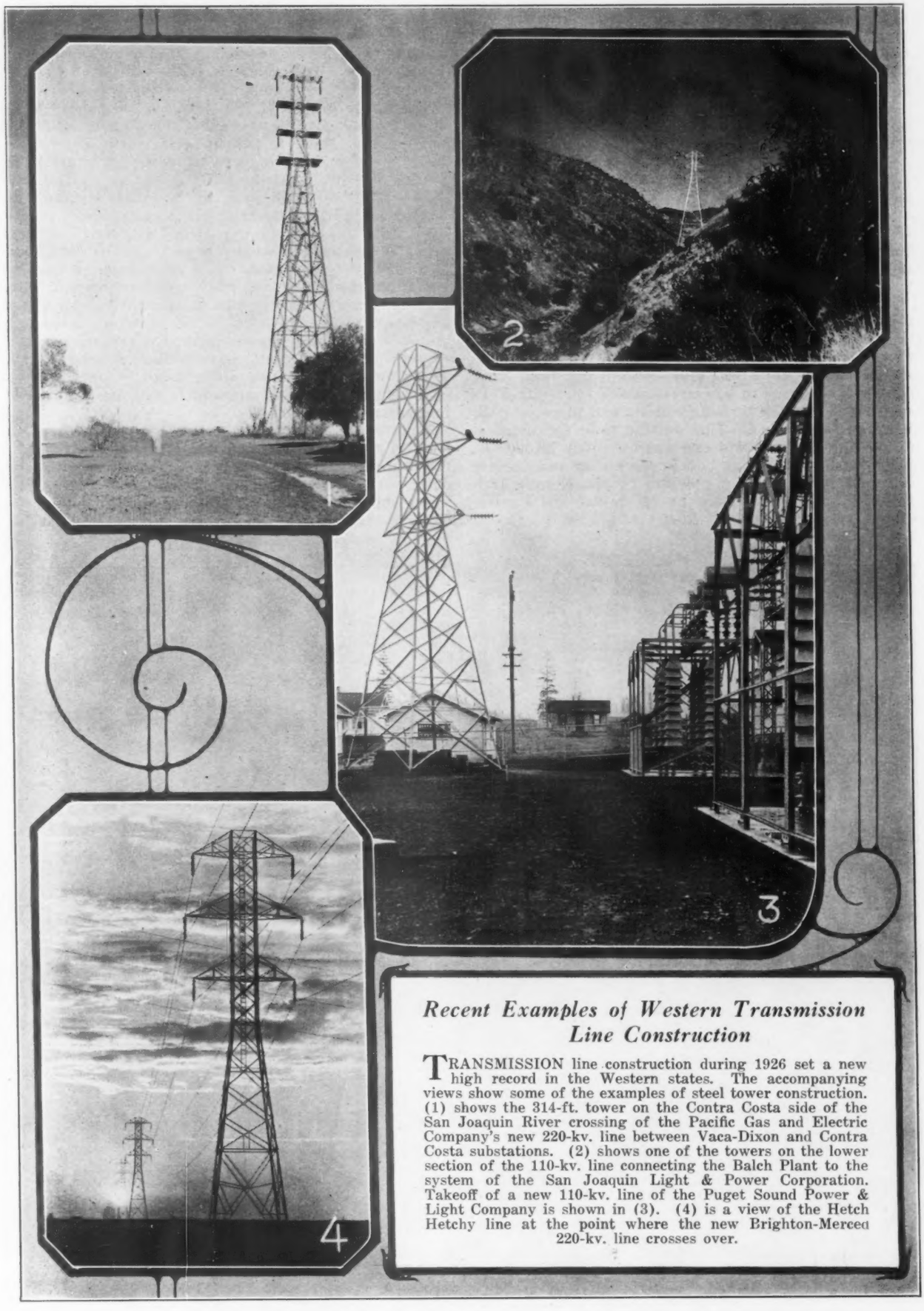
Trends in Power Development

During the year there have developed two schools of thought with reference to the relation of steam and hydro power. One contends that, with the increased efficiencies in steam equipment and the lower first cost of steam developments, the tendency should be away from hydro and toward steam. The other, while admitting that there is a definite economic balance between steam and hydro generated power, looks for more and more hydro development.

Viewing the situation in the light of programs as announced by the major utilities, the conjecture can be made that isolated hydro projects will have to show lower development costs before they can be considered as economically feasible. On projects such as the Pit River, Feather River and Big Creek developments further construction is justified on account of the water supplies already developed. Cost of hydro generated power is also being decreased through the installation of full or semi-automatic equipment in smaller plants. There has developed a definite tendency to convert series of small plants whose equipment is now almost obsolete into automatic stations.

With water conservation one of the greatest problems in California, Arizona and other Western states, it is safe to say that considerable hydro power will be developed in conjunction with domestic and irrigation water supply projects. Such plants, on account of variable water demands will be used for peaking and not for base load.

General view of construction at site of 10,000-kw. full-automatic Elwha plant of Northwestern Power & Light Company being built by Thebo, Starr & Anderton on the Olympic Peninsula in Washington.



Recent Examples of Western Transmission Line Construction

TRANSMISSION line construction during 1926 set a new high record in the Western states. The accompanying views show some of the examples of steel tower construction. (1) shows the 314-ft. tower on the Contra Costa side of the San Joaquin River crossing of the Pacific Gas and Electric Company's new 220-kv. line between Vaca-Dixon and Contra Costa substations. (2) shows one of the towers on the lower section of the 110-kv. line connecting the Balch Plant to the system of the San Joaquin Light & Power Corporation. Takeoff of a new 110-kv. line of the Puget Sound Power & Light Company is shown in (3). (4) is a view of the Hetch Hetchy line at the point where the new Brighton-Merced 220-kv. line crosses over.

Transmission Line Construction Sets Record During 1926

WESTERN central stations completed or had under construction during 1926 approximately 1,900 circuit miles of major transmission lines ranging in voltage from 30 to 220 kv. The transmission line construction budget exclusive of substations exceeded $15,000,000. The classification of lines completed or under construction follows:

Under 33 kv.	103.09 circuit miles
40 to 55 kv.	447.50 circuit miles
60 to 90 kv.	431.40 circuit miles
100 to 165 kv.	425.88 circuit miles
220 kv.	488.90 circuit miles

Chief among the extensions completed were two additions to California's 220-kv. network. The Great Western Power Company completed the 220-kv. interconnection between its system and that of the San Joaquin Light & Power Corporation with the 102.7-mile double-circuit Brighton-Merced line. The line was built to facilitate the interchange of power between the two systems and to improve system load factor.

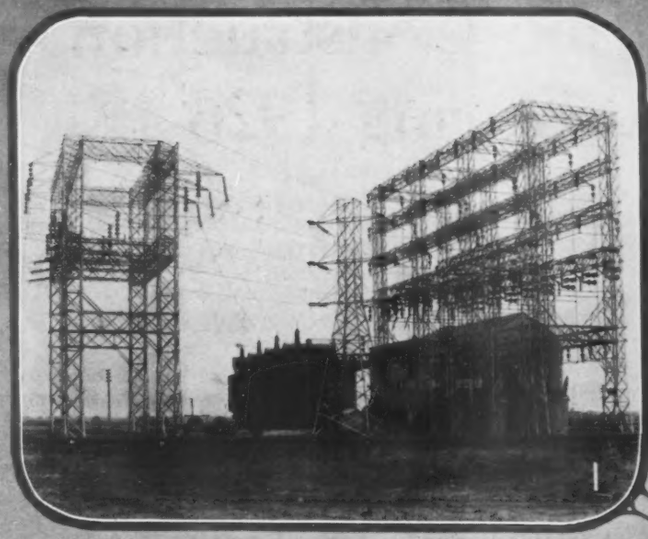
The Pacific Gas and Electric Company's 220-kv. network was extended a step farther toward the San Francisco Bay region load center through the construction of 30 miles of 220-kv. line from the Vaca-Dixon substation to the new Contra Costa substation. The new line crosses both the San Joaquin and Sacramento Rivers and sets new records for height of transmission towers at these two crossings.

Work is progressing satisfactorily on the Southern California Edison Company's new Vincent line from Los Angeles to the switching station at Big Creek No. 3 plant. The portion of the line between Los Angeles and Magunden switching station near Bakersfield has been completed and the upper half is to be finished in 1928 along with Big Creek 2-A power house. With the announcement of the new steam station at Los Angeles the Edison Company made public its plan to extend the 220-kv. network in the vicinity of Los Angeles from Laguna Bell substation to the new plant. This will give the Edison Company practically a 220-kv. loop around its most important load center.

The Great Western Power Company is extending its 220-kv. system from the Brighton substation to Oroville and thence to the Bucks Creek plant being built by the Feather River Power Company. The upper portion of this line is under construction and the Oroville-Brighton section is to be built this year.

Several important 110-kv. lines are to be built in the Northwest this year. The Puget Sound Power & Light Company plans two new lines while the lighting departments of both Seattle and Tacoma will extend their transmission systems. Another important line is that between the Shoshone Falls and American Falls plants of the Idaho Power Company.

New Balch Plant of San Joaquin Light & Power Corporation on the Kings River.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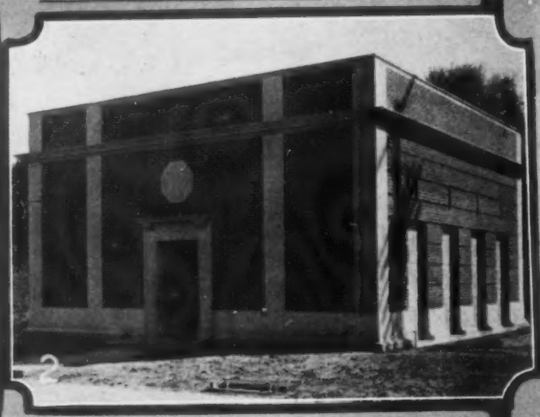
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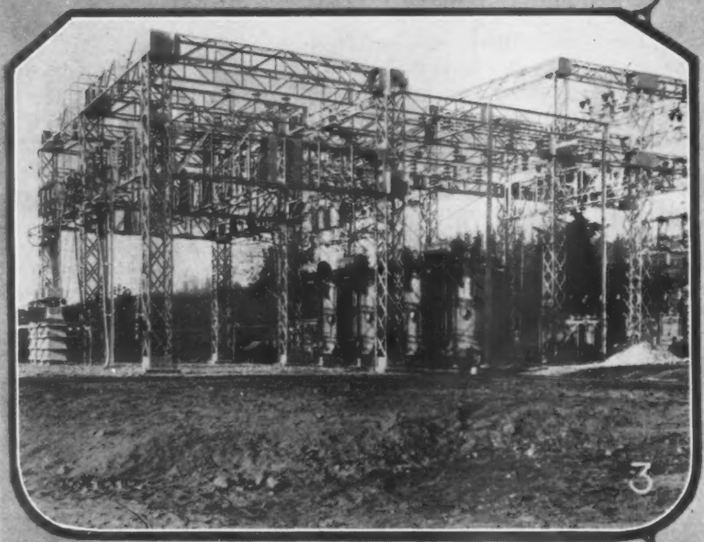
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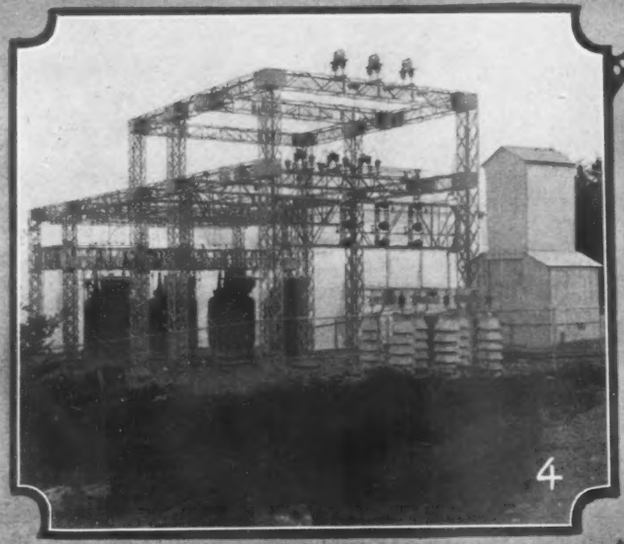
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5

Examples of Various Types of Substation Construction

MANY important substations were constructed in the Western states during 1926. (1) shows the Wilson substation of the Great Western Powcr Company at the point of interconnection of that system with the San Joaquin Light & Power Corporation near Merced. This 220-kv. station has a capacity of 30,000 kva. (2) shows the new Weidler substation of the Northwestern Electric Company in a Portland residential district. This distribution substation has a capacity of 3,000 kva. with facilities for the installation of an additional bank of transformers of the same capacity. (3) and (4), Richmond Beach and President's Point substations of the Puget Sound Power & Light Company. These two stations are the terminals of the recently laid 13.8-kv. submarine cables connecting the mainland with the Olympic Peninsula. Each has a capacity of 7,500 kva. The new Contra Costa substation of the Pacific Gas and Electric Company is shown in (5).

Some Additions to Transmission Systems in the Eleven Western States 1926-1927

Company	Location	Length (Miles)	Voltage (Kv.)	No. of Circuits	Supports	Conductor	Insulators	Spans Aver. (Ft.)	Spans Max. (Ft.)	Status	Estimated Cost
Puget Sound Power & Light Company	Beverly Park Sub to Go'd Bar	26	110	1	Wood poles National*	4/0 Copper Am. S. & W.*	Suspension, 601 West.*	600 300	....	Completed, 1926	$5,000 per mile
Puget Sound Power & Light Company	Beverly Park Sub to Forest Mill	61	110	1	Wood poles	4/0 Copper	Suspension	450	....	Proposed, 1927	$10,000 per mile
Puget Sound Power & L'ght Company	Beverly Park Sub to Canal Sub (Seattle)	22	55	1	Wood poles	4/0 Copper	Pin type	275	....	Proposed, 1927	$85,000
City of Seattle Department of Lighting	Se ttle and Tacoma	33	110	1	Wood poles	4/0 A. C. S. R.	6 and 7 Suspension	300	....	Proposed, 1927	$100,000
City of Tacoma Light Department	Tacoma	9¼	110	1	Wood poles	300,000 c. m. Copper	7 Suspension	300	....	Proposed, 1927	$200,000
The Washington Water Power Company	Fairfield and Latah, Wash.	60	110	1	Wood poles	7 str. No. 7 Copper An.	5 and 7 Suspension J. D. and Thomas	600	....	Completed, 1926	.....
The Washington Water Power Company	Brewster to Okanogan, Wash.	22	110	1	Wood poles	7 str. No. 8	Not decided	....	....	Being designed	.....
Inland Power & L'ght Company (a)	Lapwai to Reubens, Ida.	18	22	1	Wood poles	No. 2 Copper	Pin type, Thomas	350	....	Completed, 1926	$60,000
Inland Power & L ght Company (a)	Pomeroy to Clarkston, Wash.	27	66	1	Wood poles	1/0 Copper	Pin type, Locke	350	1,370	Completed, 1926	$107,000
Deschutes Power & Light Company (a)	Bend to Redmond, Ore.	18	25	1	Wood poles	0 Copper	Pin type	250	....	Completed, 1926	$50,000
Idaho Power Company	Shoshone Falls Plant to American Falls plant	82	132	1	Wood poles Kanixsu	250,000 c. m. Copper Am. Brass	10 Suspension No. 8401 Locke	600	1 1 0	Proposed, 1927	$600,000
Great Falls Power Company (b)	Chinook to Malta, M nt.	69.2	50	1	Wood poles	3 str. No. 8 Copper An.	Pin type, Pyrex	300	....	Completed, 1926	$119,000
Great Falls Power Company (b)	Ashuelot to Choteau, Mont.	26.5	50	1	Wood poles	3 str. No. 8 Copper An.	Pin type, Pyrex	300	....	Completed, 1926	$45,000
Great Falls Power Company (b)	Arro Refining Co. Line	1	50	1	Wood poles	3 str. No. 10 Iron	Pin type, P rex	300	....	Completed, 1926	$1,200
Montana Power Company	Virginia City Tap	3.3	50	1	Wood poles	3 str. No. 10 Iron	4 Suspension. Glass	300	....	Completed, 1926	$4,100
Great Falls Power Company (b)	Malta to G asgow, Mont.	70	50	1	Wood poles	3 str. No. 8 Copper An.	Pin type, Pyrex	300	....	Under construction	$105,000
Utah Power & Light Company	Cutler Plant to Salt Lake City	80	130	....	....	.....	.....	....	....	Proposed, 1927	.....
Dixie Power Company	Washington County, Utah	13.5	33	1	Wood poles L. B.	No. 6 Copper	Locke	300	980	Completed, 1926	$9,750
Dixie Power Company	Washington County, Utah	5¼	33	1	Wood poles L. B.	No. 6 Copper	Locke	300	980	Completed, 1926	$3,775
Public Service Company of Colorado	Alamosa to Salida, Colo.	63.6	44	1	Wood poles Eggers	No. 1 A. C. S. R.	Pin and Suspension O. B.	350	1,180	Completed, 1926	$105,307
Public Service Company of Colorado	Sterling to Brush, Colo.	41	44	1	Wood poles Eggers	No. 1 A. C. S. R.	Pin and Suspension O. B.	350	583	Completed, 1926	$60,000
Public Service Company of Colorado	Glenwood Springs to Ri'e, Colo.	28.9	44	1	Wood poles Eggers	No. 1 A. C. S. R.	Pin and Suspension O. B.	310	1,337	Completed, 1926	$59,975
Albuquerque Gas & Electric Company	Albuquerque to Bernalillo, N. M.	17	44	1	Wood poles McFarland	No. 3 Copper	Pin type, No. 2544 West	250	275	Under construction	$50,000
The Arizona Power Company	Prescott to Monte Cristo Mine	44	40	1	Wood poles	3 str. No. 4 Roebling	3 Suspension, Locke	450	1,400	Under cons ruction	$90,000
Salt River Valley Water Users' Association	Goldfield to Mesa, Aris.	17	110	1	Steel towers P. C. S.	2/0 Copper An.	8 and 9 Suspension 5800 Locke and 601 West	.00	.....	Completed, 1926	$45,000
Salt River Valley Water Users' Associat on	Miami to Superior, Aris.	14.7	110	1	Steel towers Rebuilt	2/0 Copper, An.	8 and 9 Suspension 5800 Locke and 601 West.	800	1,800	Rebuilt, 1926	$77,000
Salt River Valley Water Users' Association	Roosevelt to Miami, Aris.	31	110	1	Steel towers Rebuilt	2/0 Copper	8 and 9 Suspension 5800 Locke and 601 West	800	1,400	Rebuilt, 1926	$14,000
Salt River Valley Water Users' Association	Goldfield to Superior, Aris.	30	110	1	Steel towers M. I. W.	2/0 Copper, An.	Suspension, Locke 5800	800	1,800	Completed, 1926	$137,000
The California Oregon Power Company	Copco, Calif., to Klamath Falls, Ore.	38.5	66	1	Wood poles	1/0 Copper, An.	Pin type, Locke O. B. 25622 dead ends	300	3,000	Completed, 1926	$250,000
Pacific Gas and Electric Company	Melones to Copperopolis	7.5	104	1	Steel towers	7 str. 2/0 Copper	7 and 8 Suspension	800	2,090	Under construction	$110,000
Pacific Gas and Electric Company	Novato to Olema	15¼	60	1	Wood poles	No. 4 Copper	Pin type, O. B. 12552	300	1,600	Completed, 1926	$125,000
Pacific Gas and Electric Company	Manteca to Salinas	98	110	1	Wood poles	7 str. 2/0 Copper	7 and 8 Suspension	400	2,285	Completed, 1926	$425,000
Pacific Gas and Electric Company	Newark to Alviso	8¼	110	2	Steel towers	250,000 c. m. Copper 3/0 str. Copper	8 and 9 Suspension	800	1,160	Completed, 1926	$216,300
Pacific Gas and Electric Company	Vaca-Dixon Sub to Contra Costa Sub	30	220	1	Steel towers P. C. S.	500,000 c. m. Copper	13 Suspension	800	4,135	Completed, 1926	$984,000
Pacific Gas and Electric Company	Ardmore, Allison to Nicolaus	6¾	60	1	Wood poles	7 str. No. 2 Copper	Pin type	264	....	Completed, 1926	$24,650

*Abbreviations:—Towers and poles: National, National Pole Treating Company; Kanixsu, Kan'xsu Cedar Company; L. B., Lindsley Brothers Company; Eggers, Eggers Pole Company McFarland, L. D. McFarland Company, Ltd.; P. C. S., Pacific Coast Steel Company; M. I. W., Muscogee Iron Works; N. N. S. & D., Newport News Shipbuilding & Drydock Company; Chapin, Chapin Pole Company; J. H. B., J. H. Baxter & Company; Tex. Cres., Texas Creosoting Company; Conductors: Am. S. & W., American Steel and Wire Company; A. C. S. R., Aluminum Company of America; An., Anaconda Copper Mining Company; Am. Brass, American Brass Company; Roebling, J. A. Roebling & Sons Company; Al. Co. Am., Aluminum Company of Amer ca; Insulators: West., Westinghouse Electric & Manufacturing Company; J. D., Jeffery-Dewitt Insulator Company; Thomas, R. Thomas & Sons Company; Locke, Locke Insulator Corporation; Pyrex, Corning Glass Company; O. B., Ohio Brass Company; Pinco, Porcelain Insulator Corporation.

(a) Operated by Pacific Power & Light Company

(b) Subsidiary of Montana Power Company

Some Additions to Transmission Systems in the Eleven Western States 1926-1927—Continued

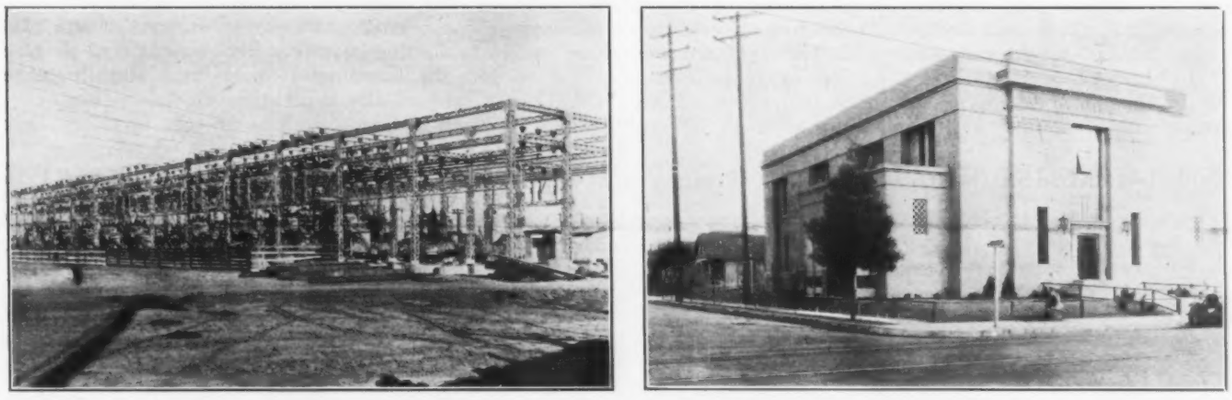
Company	Location	Length (Miles)	Voltage (Kv.)	No. of Circuits	Supports	Conductor	Insulators	Spans Aver. (Ft.)	Spans Max. (Ft.)	Status	Estimated Cost
Pacific Gas and Electric Company	Bay Line Taps to Cement	1.3	60	1	Wood poles	No. 1 str. Copper	Pin type	....	....	Reconstructed, 1926	$5,875
Great Western Power Company	San Mateo County Line to Halfmoon Bay	19	44	2	Steel poles	No. 4 Coppe	Locke No. 1055	450	850	Under construction	$105,000
Great Western Power Company	Brighton Sub to Merced	102.7	220	2	Steel towers P. C. S.	1.093 A. C. S. R.	14 Suspension, Locke	830	1,372	Completed, 1926	$2,000,000
Great Western Power Company	Brighton Sub to Oroville	69	220	2	Steel towers	1.093 A. C. S. R.	Not ordered	....	....	Proposed, 1927	$1,103,000
Great Western Power Company	Oroville to Buck's Creek	30	220	1	Steel towers P. C. S.	1.093 A. C. S. R.	14 Suspension, O. B.	650	1,537	Under Construction	$803,000
Coast Valleys Gas & Electric Company	Soledad to Kings City	64	55	1	Wood poles	No. 2 Copper, An.	Pin type, Locke	400	1,200	Under construction	$60,000
San Joaquin Light & Power Corporation	San Emedio to Tejon	13.6	70	1	Wood poles	1/0 Copper, An.	4 Suspension, O. B. 25622	352	365	Completed, 1926	$56,860
San Joaquin Light & Power Corporation	Taft to Elk Hills	12.5	70	1	Wood poles	No. 4 Copper, An.	Pin type	352	....	Completed, 1926	$22,600
San Joaquin Light & Power Corporation	Sanger to Fresno	10	70	1	Wood poles	3/0 Copper, An.	4 Suspension, O. B. 25622	352	367	Completed, 1926	$41,920
San Joaquin Light & Power Corporation	Sanger to Corcoran	42.8	110	1	Steel towers P. C. S.	266,800 c. m. Al. Al. Co. Am.	7 Suspension, O. B. 25620	755	1,010	Completed, 1926	$285,400
San Joaquin Light & Power Corporation	Sanger to Kerckhoff Power House	28.3	110	1	Steel towers and poles, P. C. S.	266,800 c. m. Al. Al. Co. Am.	7 Suspension, O. B. 25620	755	2,096	Completed, 1926	$176,787
San Joaquin Light & Power Corporation	Mendota Tap	4	70	1	Wood poles	3/0 Copper, An.	4 Suspension, O. B. 25622	....	....	Completed, 1926	$17,382
San Joaquin Light & Power Corporation	Rio Bravo to Midway	13.5	110	1	Steel poles P. C. S.	266,800 c. m. Al. Al. Co. Am.	7 Suspension, O. B. 25620	755	808	Completed, 1926	$67,390
San Joaquin Light & Power Corporation	Piedra to Sanger	11	110	1	Steel towers P. C. S.	397,500 c. m. Al. Al. Co. Am.	7 Suspension, O. B. 25620	941	1,300	Completed, 1926	$99,833
San Joaquin Light & Power Corporation	Merced, Le Grand, Wilson Sub	2.34	110	2	Steel towers P. C. S.	336,400 c. m. A. C. S. R.	7 Suspension, O. B. 2 at 20	....	....	Completed, 1926	$30,000
San Joaquin Light & Power Corporation	Blach Plant Exten.	2	110	1	Steel towers P. C. S.	397,500 c. m. Al. Al. Co. Am.	7 Suspension, O. B. 25620	....	....	Completed, 1926	$16,300
San Joaquin Light & Power Corporation	Exchequer Plant	0.5	110	1	Steel towers P. C. S.	266,800 c. m. Al. Al. Co. Am.	7 Suspension, O. B. 25620	....	....	Completed, 1926	$4,000
San Joaquin Light & Power Corporation	Kingsburg to Guernsey Corner	22	70	1	Wood poles	3/0 Copper, An.	4 Suspension, O. B. 25622	352	387	Completed, 1926	$79,650
Southern California Edison Company	Long Beach to Torrance	7	66	1	Wood poles	4/0	10 in. C & P	225	....	.....	$45,000
Southern California Edison Company	Laguna Bell to City Sub	7	66	1	Wood poles	4/0	10 in. C & P	175	....	.....	$50,000
Southern California Edison Company	Laguna Bell to City Sub	7	66	1	Wood poles	4/0	10 in. C & P	175	....	.....	$50,000
Southern California Edison Company	Laguna Bell to Westflor	7	66	1	Wood poles	4/0	10 in. C & P	175	....	.....	$50,000
Southern California Edison Company	Eagle Rock to Ripple	7	66	1	Wood poles	4/0	10 in. C & P	150	....	.....	$35,000
Southern California Edison Company	Redlands to Yucaipa	10	33	1	Wood poles	2/0	Pin type	175	....	.....	$55,000
Southern California Edison Company	Signal Hill to Somerset	8	66	1	Wood poles	4/0	10 in. C & P	175	....	.....	$20,000
Southern California Edison Company	Rector to Venida	4	66	1	Wood poles	4/0	10 in. C & P	200	....	.....	$20,000
Southern California Edison Company	Rector to Visalia	3	66	1	Wood poles	4/0	10 in. C & P	200	....	.....	$40,000
Southern California Edison Company	Rector to Tulare	7	66	1	Wood poles	4/0	10 in. C & P	200	....	.....	$45,000
Southern California Edison Company	Goshen to Laurel	9	66	1	Wood poles	4/0	10 in. C & P	200	....	.....	$45,000
Southern California Edison Company	Kern River No. 1 to Borel	18	66	1	Steel towers	4/0	10 in. C & P	800	....	.....	$180,000
Southern California Edison Company	Lancaster to Del Sur	9	66	1	Wood poles	4/0	10 in. C & P	200	....	.....	$24,000
Southern California Edison Company	Somis to Colonia	6	66	1	Wood poles	4/0	10 in. C & P	200	....	.....	$35,000
Southern California Edison Company	Del Norte to Colonia	5	66	1	Wood poles	4/0	10 in. C & P	200	....	.....	$ 0,000
Southern California Edison Company	Beverly to Marine	7	66	1	Wood poles	4/0	10 in. C & P	200	....	.....	$42,000
Southern California Edison Company	Laguna Bell to Marine	22	66	1	Wood poles	4/0	10 in. C & P	200	....	.....	$154,000
Southern California Edison Company	Eagle Rock to Garfield	4	66	1	Wood poles	4/0	10 in. C & P	200	....	.....	$15,000

Some Additions to Transmission Systems in the Eleven Western States 1926-1927—Continued

Company	Location	Length (Miles)	Voltage (Kv.)	No. of Circuits	Supports	Conductor	Insulators	Spans Aver. (Ft.)	Spans Max. (Ft.)	Status	Estimated Cost
Southern California Edison Company	Eagle Rock to Alhambra	4	66	1	Wood poles	4/0	10 in. C & P	200	....	.....	$15,000
Southern California Edison Company	Lightipe to Carson	3	66	2	Wood poles	4/0	10 in. C & P	200	....	.....	$35,000
Southern California Edison Company	Lightipe to Katella	6	66	1	Wood poles	4/0	10 in. C & P	200	.....	.....	$42,000
Southern California Edison Company	Lightipe to Katella	8	66	1	Wood poles	4/0	10 in. C & P	200	....	.....	$56,000
Southern California Edison Company	Lightipe to Signal Hills	5	66	1	Wood poles	4/0	10 in. C & P	200	....	.....	$35,000
Southern California Edison Company	Lightipe to Long Beach	2	66	4	Steel towers	4/0	10 in. C & P	800	....	.....	$56,000
Southern California Edison Company	Lightipe to Somerset	3	66	2	Wood poles	4/0	10 in. C & P	200	....	.....	$26,000
Southern California Edison Company	Lightipe to Bardin	3	66	1	Wood poles	4/0	10 in. C & P	200	....	.....	$21,000
Southern California Edison Company	Westlow to Culver Junction	5	66	1	Wood poles	4/0	10 in. C & P	200	....	.....	$35,000
Southern California Edison Company	Stanton to Ocean View	7	66	1	Wood poles	4/0	10 in. C & P	200	....	.....	$42,000
Southern California Edison Company	Fairview to Ocean View	9	66	1	Wood poles	4/0	10 in. C & P	200	....	.....	$54,000
Southern California Edison Company	Fairview to Irvine	9	66	1	Wood poles	4/0	10 in. C & P	200	....	.....	$50,000
Southern California Edison Company	Lightipe to Colton	54	66	1	Wood poles	4/0	10 in. C & P	200	....	.....	$378,000
Southern California Edison Company	Decles to Jurupa	6	66	1	Wood poles	4/0	10 in. C & P	200	....	.....	$42,000
Southern California Edison Company	Colton to San Bernardino	4	66	1	Wood poles	4/0	Pin type	200	....	.....	$20,000
Southern California Edison Company	Big Creek 3 to Crescenta, Los Angeles	223.5	220	1	Steel towers P. C. S. and N. N. S. & D	1,033,500 c. m. A. C. S. R.	Suspension, West.	1,420	5,191	Under construction	.....
Los Angeles Bureau of Power & Light	Central No. 1 to Central No. 2	11.2	110	2	Steel towers P. C. S.	500 000 c. m. Copper An.	8 Suspension, O. B.	735	920	Under Construction	.....
Southern Sierras Power Company	Colorado River Sub to Yuma	1.1	33	1	Wood poles	No. 2 str. Copper	Pin type	260	289	Completed, 1926	$10,000
Southern Sierras Power Company	El Centro to Calexico	12.3	33	1	Wood poles Chapin	2/0 Str. Copper Roebling	Pin type, O. B.	330	360	Completed, 1926	$54,000
Southern Sierras Power Company	San Bernardino to Perris	24.44	33	1	Wood poles J. H. B. and Tex. Cres.	2/0 Str. Copper Roebling	Pin type, Pinco No. 75	330	443	Completed, 1926	$100,000
San Diego Consolidated Gas & Electric Company	Sub "F" to El Cajon	10	66	1	Wood poles	1/0 Copper, An.	5 and 6 Suspension Locke	450	1,030	Completed, 1925 Reinsulated, 1927	....

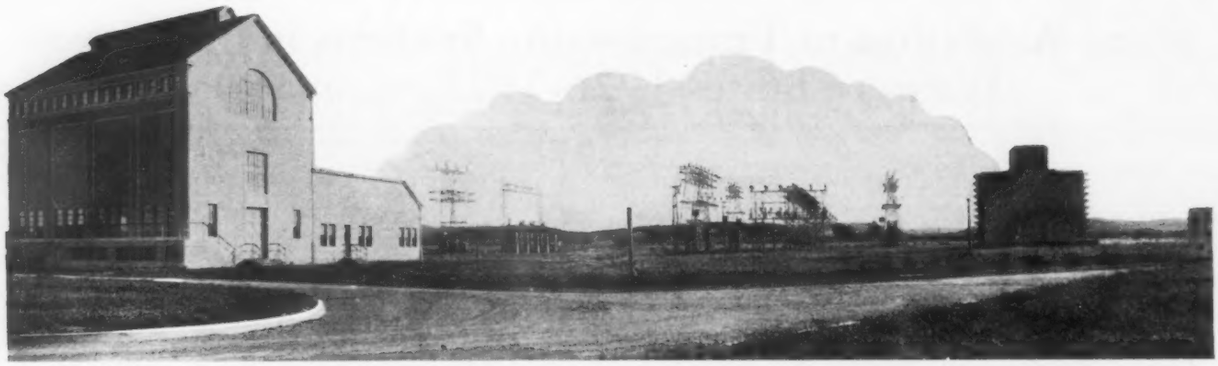
*Abbreviations:—Towers and poles: National, National Pole Treating Company; Kanawha, Kanawha Cedar Company; L. B., Lindsley Brothers Company; Eggers, Eggers Pole Company; McFarland, L. D. McFarland Company, Ltd.; P. C. S., Pacific Coast Steel Company; M. I. W., Muscogee Iron Works; N. N. S. & D., Newport News Shipbuilding & Drydock Company; Chapin, Chapin Pole Company; J. H. B., J. H. Baxter & Company; Tex. Cres., Texas Creosoting Company; Conductors: Am. S. & W., American Steel and Wire Company; A. C. S. R., Aluminum Company of America; An., Anaconda Copper Mining Company; Am. Brass, American Brass Company; Roebling, J. A. Roebling & Sons Company; Al. Co. Am., Aluminum Company of America; Insulators: West., Westinghouse Electric & Manufacturing Company; J. D., Jeffery-Dewitt Insulator Company; Thomas, R. Thomas & Sons Company; Locke, Locke Insulator Corporation; Pyrex, Corning Glass Company; O. B., Ohio Brass Company; Pinco, Porcelain Insulator Corporation.

(a) Operated by Pacific Power & Light Company (b) Subsidiary of Montana Power Company



Two Southern California Municipal Substations

A part of the Los Angeles Bureau of Power & Light's central receiving station No. 2 (left) showing the 14-position 33-kv. rack which is one of four planned for the ultimate development. At the right is the Bureau's new substation No. 5 serving industrial load in the vicinity of Ninth and Mateo Streets, Los Angeles.



Contra Costa substation of Pacific Gas and Electric Company.

Central Station Operation Follows Normal Trend in 1926

DURING 1926 central stations of the eleven Western states continued to keep pace with the rapid growth and development of the last five years. Energy generated reached a total of 12,710,000,000 kw-hr. and gross revenue crossed the two hundred million dollar mark. Throughout the year the West continued to hold its position as the most highly developed section of the United States electrically. Figures covering the operation of the power companies show that in the eleven Western states there are 14 per cent of the electric consumers of the country using approximately 18.5 per cent of the total energy generated. Western plants generated 49 per cent of the output of the nation's water power plants.

There was an increase of 10.3 per cent in the amount of energy generated, production in 1925 being 11,519,970,000 kw-hr.. as against 12,710,000,000 kw-hr. in 1926. Of the energy generated hydro plants contributed 10,741,000,000 kw-hr. and steam plants 1,969,000,000 kw-hr. Hydro production increased 9.4 per cent over 1925 and steam production 15.8 per cent. In the operation of steam plants there was consumed during the year 646,000 short tons of coal, 2,508,000 bbl. of fuel oil and 11,291,000,000 cu. ft. of natural gas. This is a drop of 39,653 tons of coal and 74,597 bbl. of oil as compared with 1925. There was a slight increase in the consumption of natural gas. As in the past, the West continues to be one of the largest fuel oil and gas consuming sections of the country in the generation of power, 27.2 per cent of the fuel oil and 22 per cent of the gas having been consumed in this territory.

Estimated gross revenue from the sale of power during the year was $214,000,000 as compared to $193,800,000 in 1925, an increase of 10.4 per cent. Operating and maintenance expense for $75,000,000 for the year as compared to $64,200,000 for 1925. Operating ratio increased from 33.1 to 35.0 per cent but is still considerably below the national average of 43.5 per cent for 1926.

Installed generating capacity in the plants of the operating companies of the West is now 4,326,200 kva. as compared to 26,812,710 kva. for the United states.

Growth in Customers

The number of customers served by Western central stations reached 2,726,209 on Jan. 1, 1927, showing an increase of 179,195 for the year. Domestic consumers provide the bulk of the market from a quantitative standpoint, representing a total of 2,156,371. There are 416,989 commercial lighting customers and 152,849 industrial power customers. The West has 13.5 per cent of the country's residential consumers, 14.2 per cent of the commercial lighting customers and 22.8 per cent of the industrial power consumers, despite the fact that the territory contains only slightly more than 8 per cent of the population of the nation.

It is evident in some sections of this territory that

Table I--Central Station Operation in 11 Western States in Comparison with United States, 1925 and 1926

Item	11 Western States		United States	
	1925	1926	1925	1926
Energy generated (thousands of kw-hr.)	11,519,970	12,710,000	61,158,857	68,732,000
Energy generated by hydro plants (thousands of kw-hr.)	9,819,140	10,741,000	21,996,547	25,132,000
Energy generated by fuel plants (thousands of kw-hr.)	1,700,830	1,969,000	39,162,310	43,600,000
Coal consumption by central stations (short tons)	685,653	646,000	35,321,502	36,889,000
Fuel oil consumption by central stations (bbl.)	2,582,597	2,508,000	9,742,238	9,249,000
Gas consumption by central stations (thousands of cu. ft.)	10,496,443	11,291,000	45,479,189	49,053,000
Gross revenue from sale of energy	$193,800,000	$214,000,000	$1,506,600,000	$1,684,000,000
Operating and maintenance expense (before deductions for interest, taxes and depreciation)	$64,200,000	$75,000,000	$661,200,000	$735,000,000

Table II--Energy Generated in Public Utility Plants of 11 Western States, 1921-1926*

State	ENERGY GENERATED (THOUSANDS OF KW.-HR.)					
	1921	1922	1923	1924	1925	1926†
California	3,982,938	4,379,703	5,069,314	5,566,440	6,215,813	6,979,000
Oregon	468,534	512,804	594,434	678,394	729,859	815,000
Washington	1,176,662	1,285,625	1,446,486	1,503,560	1,623,007	1,391,000
Nevada	36,532	39,282	47,048	41,623	39,703	41,000
Utah	119,551	145,689	272,577	266,946	339,967	356,000
Arizona	132,434	144,615	157,183	153,196	130,531	154,000
New Mexico	15,768	17,140	18,268	19,913	21,787	25,000
Colorado	362,651	413,475	461,570	490,030	522,892	562,000
Wyoming	37,855	38,985	48,853	53,556	55,544	58,000
Idaho	550,149	615,783	694,781	792,532	754,079	812,000
Montana	596,610	984,972	1,138,545	1,145,285	1,262,629	1,391,000

*U. S. G. S. Data.
†November and December estimated.

the saturation of domestic consumers has almost been reached. Increases during the past year were but slightly more than the normal population increase. With this fact in mind, it is evident that if the pace in energy generation is to be maintained commercial programs must be instituted and closely followed looking toward greater and greater consumption in the home.

California leads the list of Western states both in energy consumption and in energy generated. The number of customers in that state is now 1,599,315 of whom 1,230,450 are residential consumers. Washington, Colorado, Oregon and Utah are next in the order named. California is only exceeded by New York which has 2,577,560 customers, Illinois with 1,679,680 and Pennsylvania with 1,623,530. California dropped from third to fourth in this respect during the year, having been passed by Pennsylvania.

In energy generation, California, with 6,979,000,000 kw-hr., is only exceeded by New York and Pennsylvania. Public utility plants in New York produced 11,078,000,000 kw-hr. during 1926, and those in Pennsylvania 7,461,000,000 kw-hr. Washington, which stands second in the list of Western states is ninth in the national list.

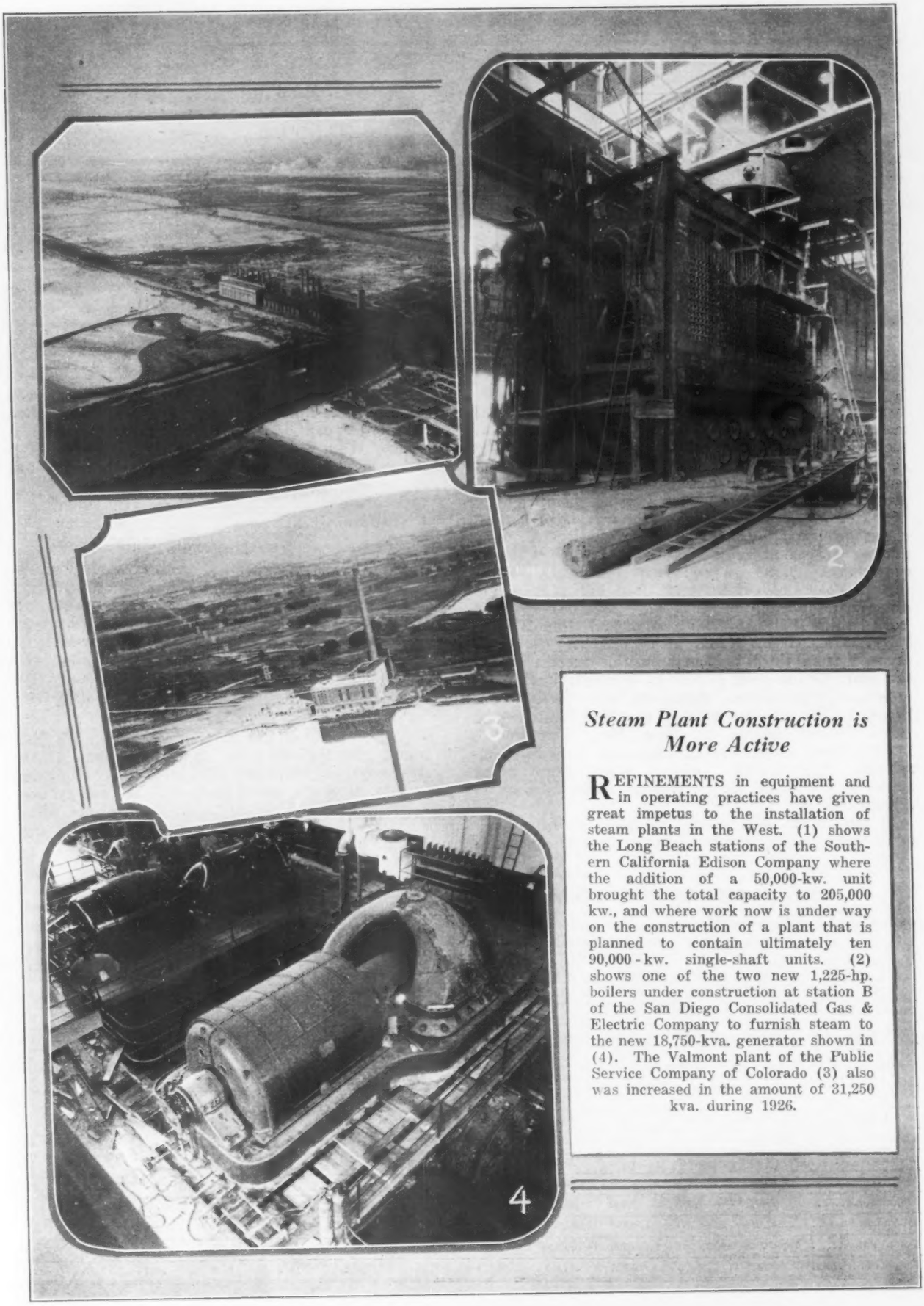
In per capita generation, the West exceeds every other section of the country. In the first fifteen states are Montana, California, Idaho, Washington, Oregon and Utah. The first four head the list for the nation in the order named, Oregon is sixth being only exceeded by West Virginia, and Utah is fourteenth. Per capita generation for all of the Western states follows:

Montana	1,930 kw-hr.
California	1,600 kw-hr.
Idaho	1,520 kw-hr.
Washington	1,092 kw-hr.
Oregon	925 kw-hr.
Utah	678 kw-hr.
Colorado	512 kw-hr.
Nevada	512 kw-hr.
Arizona	334 kw-hr.
Wyoming	237 kw-hr.
New Mexico	62 kw-hr.

In justice to Utah the statement can be made that it would probably exchange places with Idaho if the figures were to represent kilowatt-hour consumption per capita, since the major portion of the energy used in Utah is produced in the Bear River plants whose production is listed in Idaho because these plants are located in the latter state.

Table III--Classification of Central Station Customers Showing Growth During 1926

State	Total Central Station Customers			Domestic Lighting Customers			Commercial Lighting Customers			Industrial Power Customers		
	Jan. 1 1926	Jan. 1 1927	Growth 1926	Jan. 1 1926	Jan. 1 1927	Growth 1926	Jan. 1 1926	Jan. 1 1927	Growth 1926	Jan. 1 1926	Jan. 1 1927	Growth 1926
California	1,489,570	1,599,315	109,745	1,147,670	1,230,450	82,780	246,500	264,685	18,185	95,400	104,180	8,780
Oregon	171,205	186,495	15,290	139,900	151,930	12,030	23,630	25,970	2,340	7,675	8,595	920
Washington	325,300	351,810	26,510	263,500	284,850	21,350	46,000	50,370	4,370	15,800	16,590	790
Nevada	16,450	16,740	290	13,630	13,790	150	2,240	2,350	110	580	610	30
Utah	122,346	126,976	4,630	107,800	111,680	3,880	11,382	11,942	560	3,164	3,354	190
Arizona	40,348	41,908	1,560	33,211	34,411	1,200	5,207	5,467	260	1,930	2,030	100
New Mexico	24,050	25,690	1,640	19,700	21,120	1,420	3,400	3,570	170	950	1,000	50
Colorado	182,820	194,675	11,855	150,900	161,070	10,170	22,990	24,300	1,310	8,930	9,305	375
Wyoming	32,040	33,625	1,585	27,400	28,850	1,450	3,360	3,445	85	1,280	1,330	50
Idaho	64,275	67,425	3,150	50,800	53,490	2,690	11,500	11,860	360	1,975	2,075	100
Montana	78,610	81,550	2,940	62,550	64,740	2,190	12,610	13,030	420	3,450	3,780	330
11 Western States	2,547,014	2,726,209	179,195	2,017,061	2,156,371	139,310	388,819	416,989	28,170	141,134	152,849	11,715
Total U. S.	18,068,221	19,528,581	1,460,360	14,700,510	15,923,060	1,022,550	2,735,661	2,920,501	184,840	632,050	685,020	52,970
Percent of U. S. total	14.1	14.0	12.3	13.7	13.5	13.6	14.2	14.2	15.3	22.7	22.3	22.1



Steam Plant Construction is More Active

REFINEMENTS in equipment and in operating practices have given great impetus to the installation of steam plants in the West. (1) shows the Long Beach stations of the Southern California Edison Company where the addition of a 50,000-kw. unit brought the total capacity to 205,000 kw., and where work now is under way on the construction of a plant that is planned to contain ultimately ten 90,000-kw. single-shaft units. (2) shows one of the two new 1,225-hp. boilers under construction at station B of the San Diego Consolidated Gas & Electric Company to furnish steam to the new 18,750-kva. generator shown in (4). The Valmont plant of the Public Service Company of Colorado (3) also was increased in the amount of 31,250 kva. during 1926.

Expansion of California Electric Systems During 1926

By F. E. Bonner

District Engineer, U. S. Forest Service, representing the Federal Power Commission, San Francisco

NEW generating capacity totaling 86,750 kva. was added to the California electric systems in 1926. This increase consisted of the Exchequer hydro plant of the Merced Irrigation District with 31,250 kva. and the addition of 55,500 kva. to the Long Beach steam plant of the Southern California Edison Company.

The total installed capacity of the electric systems serving the state now aggregates 2,107,344 kva. The distribution between the various utility companies and municipal agencies is presented in Table I. This table also shows the total output capability of the various systems under normal operating conditions.

The new capacity placed in operation during 1926 is rather small compared with the unusually large increase of 276,048 kva. in 1925. Ever since the war, utility agencies have been hard pressed to keep development programs abreast of the rapidly increasing demand. During 1925 a combination of circumstances served to bring into operation more capacity than was essential immediately to meet the normal market increase and thus, in 1926, for the first time in eight years there existed sufficient margin over the requirements of the moment to permit some relief from emergency construction.

Moreover, the new generator units installed in 1926 do not represent the full measure of the increased capacity provided, since several large storage projects were completed during the year which add considerably to the output capability of the power systems they serve. The completion of the Florence Lake dam provided storage capacity of 65,000 acre-ft. in the high Sierra at the head of the great Big Creek project of the Southern California Edison Company with developed head of 4,533 ft. The diversion of this quantity of water through the existing plants will represent an increased output of 200,000,000 kw-hr., or the equivalent of about 46,000 kw. of generating capacity operating on a 50 per cent capacity factor. Also, the new Almanor dam of the Great Western Power Company completed late in the year, creates additional capacity of 1,000,000 acre-ft. which, on the average, will increase the potential output of the Caribou and Big Bend plants by approximately 225,000,000 kw-hr. annually, or the equivalent of 51,000 kw. in generator capacity. A third storage project completed was the raising of the Fordyce dam. This added 26,000 acre-ft. of capacity and approximately 40,000,000 kw-hr. a year to the possible output of the Drum system of the Pacific Gas and Electric Company. The latter is equivalent to about 10,000 kw. of generating capacity. It is clear, therefore, that the three new storage projects together represent the equivalent of 107,000 kw. in generating capacity, in addition to the 86,750 kva. of new plant capacity provided.

During the past year construction has been proceeding and is now well along on several notable plants which will be completed and placed in operation during the next two years. The tendency toward exceptionally high heads is particularly noteworthy. Three of the plants under way will have higher heads than any previously constructed in this country. The Balch project of the San Joaquin Light & Power Corporation will have a static head of 2,337 ft. This plant is practically completed and is scheduled for beginning operation early in 1927. The other two high head plants are the Big Creek 2-A plant of the Southern California Edison Company with static head of 2,417 ft. and the Bucks Creek plant of the Feather River Power Company with static head of 2,561 ft. The two latter

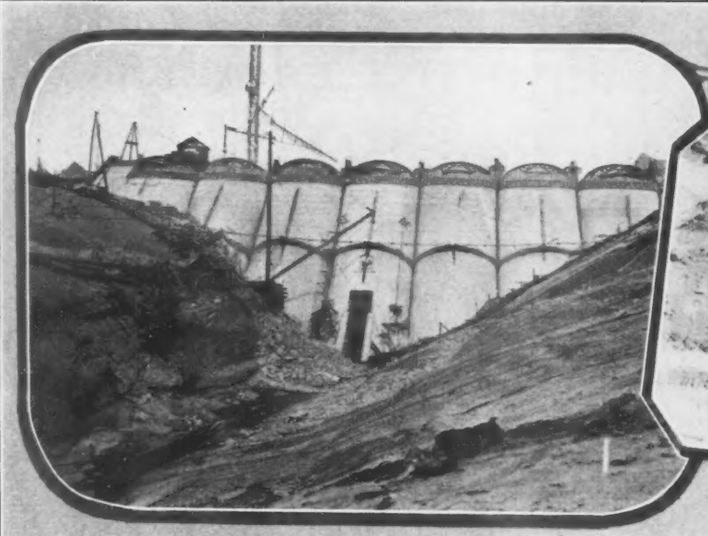
GENERATING CAPACITY OF CALIFORNIA ELECTRIC SYSTEMS

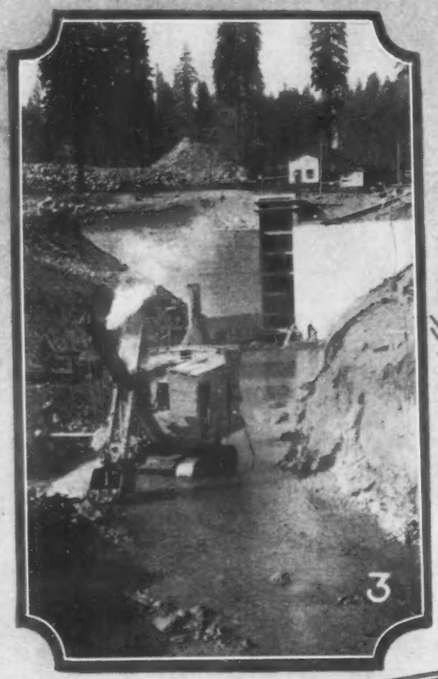
TABLE I

(January 1, 1927)

SYSTEM	No. of Plants	Generator Rating Kva.		Output Capability Kw.	
		Hydro-electric	Fuel-electric	Hydro-electric	Fuel-electric
Southern California Edison Company	23	348,350	269,900	347,600	256,600
Pacific Gas and Electric Company	32	398,975	142,000	345,000	136,500
San Joaquin Light & Power Corporation	14	84,600	54,050	81,650	53,500
Great Western Power Company	6	131,600	33,000	133,000	30,000
Los Angeles Gas and Electric Corporation	2		128,450		105,000
City of Los Angeles	10	103,066		86,460	
City of San Francisco	2	83,000		83,300	
Southern Sierras Power Company	16	69,308	12,018	61,425	8,550
The California Oregon Power Company (a)	11	71,110	350	69,155	200
Western States Gas & Electric Company	5	33,125	10,000	26,500	8,000
San Diego Consolidated Gas & Electric Corporation	2		37,250		29,800
Merced Irrigation District	1	31,250		36,000	
Turlock and Modesto Irrigation Districts	3	19,750	1,250	22,000	1,500
City of Pasadena	1		19,327		18,000
Snow Mountain Water & Power Company	1	9,000		6,800	
Truckee River Power Company (b)	5	8,600		8,750	
Coast Counties Gas & Electric Company	3	990	1,250	950	1,000
Utica Mining Company	2	2,150		2,380	
Ontario Power Company	3	1,650		1,560	
Coast Valleys Gas & Electric Company	3		1,375		1,575
Escondido Mutual Water Company	2	600		800	
Totals	147	1,397,124	710,220	1,313,330	650,225
Combined Totals		2,107,344 kva.		1,963,555 kw.	

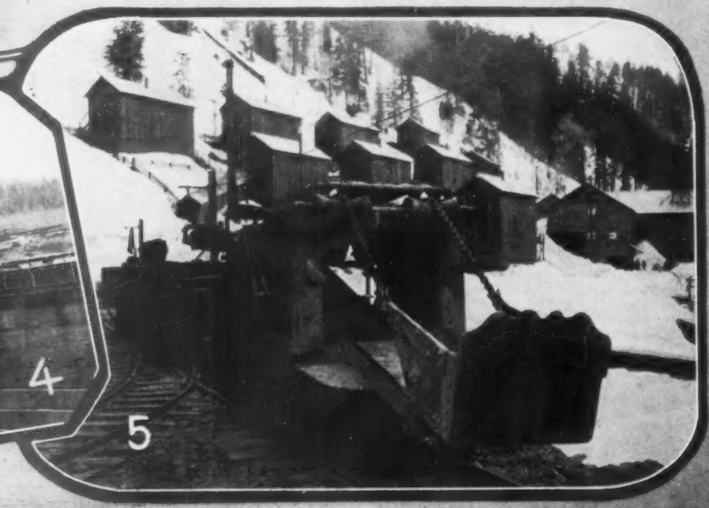
(a) Includes 12,600 kva. in Oregon hydro plants and 350 kva. in Oregon steam plans.
(b) Includes 7,100 kva. in Nevada hydro plants.





Types of Construction on Various California Hydro Projects

DEVELOPMENT of additional water supplies for power generation, as well as the construction of power plants, played an important part in the construction programs of California power companies during 1926. (1) shows a section of the multiple arch dam of the Florence Lake reservoir of the Southern California Edison Company during construction. This reservoir stores water as well as diverting the flow of the South Fork of the San Joaquin River through the Florence Lake tunnel. (2) illustrates construction work on the Bucks Creek dam of the Feather River Power Company. It shows a section of the gravity toe wall of the earth-fill dam under construction. The ultimate height of the dam can be determined from the tree line in the background. Work of deepening the outlet of Lake Almanor is shown in (3). The Great Western Power Company has spent $2,000,000 to raise Big Meadows dam 45 ft. to provide for the storage of 1,300,000 acre-ft. of water. (4) shows construction work on the Bucks Creek reservoir at the point where the outlet control tower is to be located. One of the electric mucking machines used to facilitate operations on the Huntington-Shaver conduit of the Southern California Edison Company is shown in (5). This project is to provide storage for the new Big Creek 2-A plant now under construction.



plants will be finished in 1928. According to construction now under way and planned for the immediate future the following will comprise the new electric installations of the next two years:

Plant	Owner	Capacity—Kva.
1927		
Balch	San Joaquin Light & Power Corporation	33,000
Melones	Sierra & San Francisco Power Company	27,000
Haiwee	City of Los Angeles	7,000
Steam plant	City of Los Angeles	30,000
Steam plant	San Diego Consolidated Gas & Electric Company	18,750
		115,750

Plant	Owner	Capacity—Kva.
1928		
Big Creek 2A	Southern California Edison Company	100,000
Bucks Creek	Feather River Power Company	50,000
Don Pedro	Turlock and Modesto Irrigation Districts	10,000
Steam plant	City of Pasadena	15,000
Steam plant	Southern California Edison Company	90,000
		265,000

As in the case of the 1926 improvements there will be completed in 1927 a storage development which will increase the output capability of the power system below. This is the Bowman project of the Nevada Irrigation District which will add about 150,000,000 kw-hr. annually to the production possibilities of the Drum system of the Pacific Gas and Electric Company.

While the new generating capacity placed in operation during 1926 is considerably less than the record breaking total of new installations completed in 1925, there is no tendency toward reduction in the rate of growth of energy output. Preliminary figures for 1926 indicate a total output of approximately 6,900 million kw-hr. which represents an increase of 11 per cent over the 6,200 million kw-hr. generated in 1925. This rate of increase is practically the same as that for the preceding five-year period, which showed a growth of from 3,686 million kw-hr. in 1920 to 6,212 in 1925, or about 11 per cent annual compounding. Table II presents for the period from 1913 the total energy production and the division between hydro and fuel generation. The disturbance of the ratio between hydro and fuel by the occurrence of dry years is particularly striking. In normal water years slightly more than 80 per cent of the electric energy of the State is produced by the hydro plants, while in the drought year of 1924 the ratio fell to 57.5 per cent. Data so far available indicate that the proportion of hydro generated energy in 1926 will be about the same as last year.

TABLE II
ELECTRIC ENERGY PRODUCTION
California Electric Systems
1913 to 1925, Inc.

Year	Hydro Kw-hr.	Per Cent	Fuel Kw-hr.	Per Cent	Total	Per Cent Inc.
1913	1,252,999,000	66.4	634,059,000	33.6	1,887,058,000	
1914	1,834,682,000	85.7	305,918,000	14.3	2,140,600,000	13.4
1915	1,884,660,000	83.6	368,437,000	16.4	2,253,097,000	5.3
1916	2,079,365,000	86.4	326,917,000	13.7	2,406,282,000	6.8
1917	2,286,711,000	82.7	479,911,000	17.3	2,766,622,000	15.0
1918	2,342,698,000	77.0	700,344,000	23.0	3,043,042,000	10.0
1919	2,337,698,000	70.9	958,198,000	29.1	3,295,896,000	8.3
1920	2,570,517,000	69.7	1,115,718,000	30.3	3,686,235,000	11.8
1921	3,238,628,000	82.1	706,928,000	17.9	3,945,556,000	7.0
1922	3,748,407,000	87.0	561,277,000	13.0	4,309,684,000	9.2
1923	4,134,965,000	81.7	924,351,000	18.3	5,059,316,000	17.4
1924	3,185,359,000	57.5	2,355,949,000	42.5	5,541,308,000	9.5
1925	5,215,242,000	83.9	996,997,000	16.6	6,212,239,000	12.1
Total	36,111,931,000	77.6	10,435,004,000	22.4	46,646,935,000	
	Ave. annual increase 1913 to 1925 (compounding)					10.5

California now produces slightly more than 23 per cent of the entire hydro electric production of the country, leading all other states. In total production including both hydro and fuel generation, the State is second to New York and contributes about 9½ per cent of electric production of the United States. California's extensive utilization of its water power resources is emphasized by the fact that while it produces more than 80 per cent of its power requirements by hydro plants, the country as a whole obtains only one-third from hydro sources and the other two-thirds from fuel plants.

The general characteristics of the seasonal demand in 1926 evidenced no particular deviation from those of the immediate past. Fig. 1 shows the mean monthly output for the period since 1913. In 1926, as in the previous year, July was the month of largest demand and February the lowest. Based on the 5-year period 1921-1925 the following represents the average monthly distribution of load:

January	7.3%	May	8.8%	September	8.7%
February	6.9%	June	9.0%	October	8.5%
March	7.8%	July	9.4%	November	8.0%
April	7.9%	August	9.5%	December	8.2%

The 1926 output amounted to about 3,300 kw-hr. for each kva. of installed capacity. On the basis of a 0.9 power factor this represents about 41.5 per cent capacity factor operation. The hydro plants produced slightly over 4,000 kw-hr. per kva. On 0.9 power factor basis this was equivalent to operation with

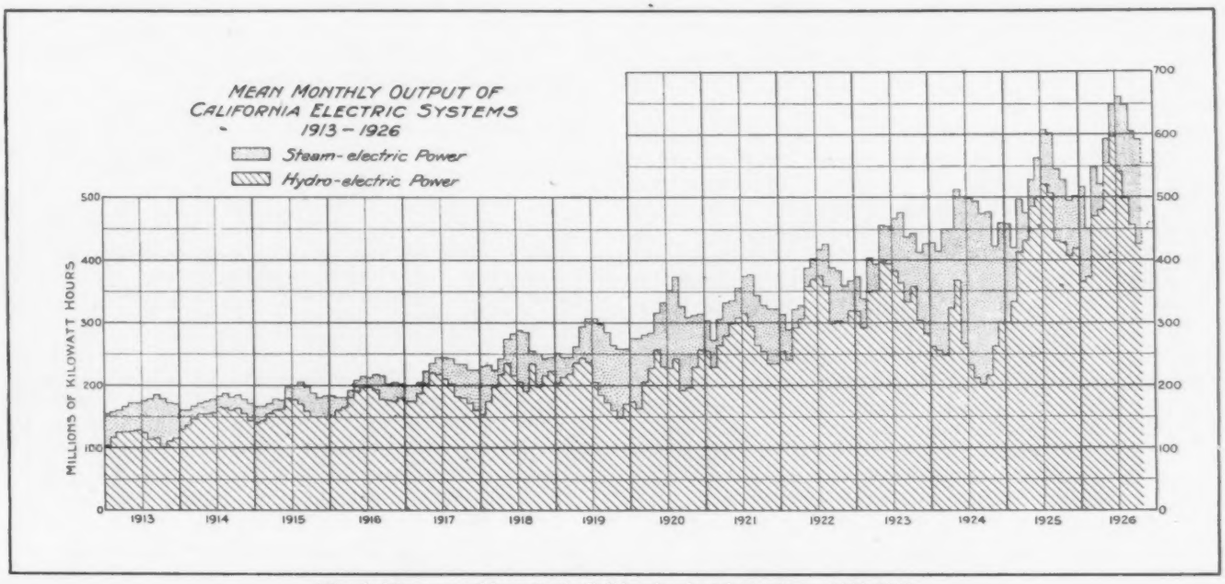


Fig. 1. Mean monthly output, California electric systems, 1913-1926.

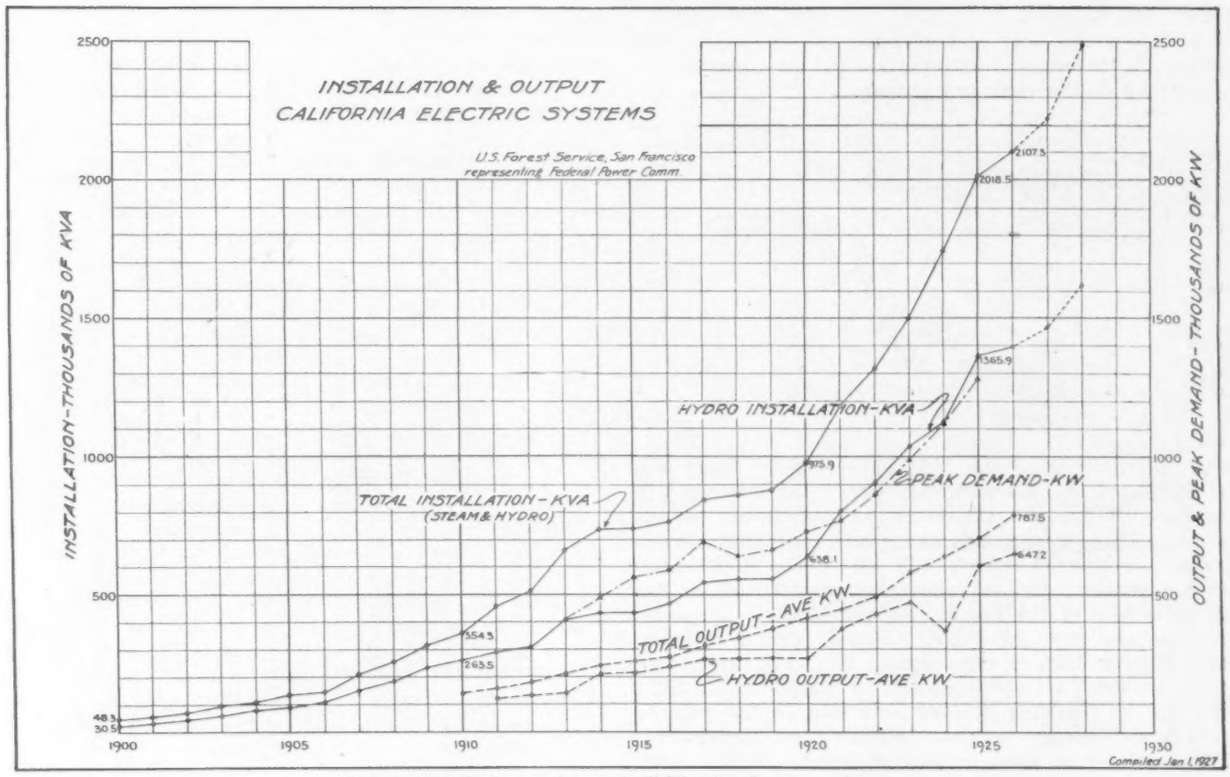


Fig. 2. Installation and output, California electric systems.

capacity factor of about 52.5 per cent. Fig. 2 presents a comparison of the progressive installation and output for past years, and also shows the peak demand curve. The latter indicates a state load factor in recent years ranging between 55 and 60 per cent. It is of interest to note also that the peak demand is roughly equivalent to the hydro installation and about 30 per cent less than the total installation.

The market for electric energy has experienced such an amazing expansion during the past five years that estimates of the growth to be anticipated in the future become a matter of considerable importance.

The application of electricity has become so universal that a serious power shortage would completely disrupt industrial, agricultural and domestic activity. On the public utilities and municipal agencies rests therefore an obligation to anticipate requirements sufficiently far ahead to absolutely assure ample supply to meet all demands.

In a territory of diversified use as in California the growth of electric energy consumption is primarily a function of the population growth. Moreover, the kilowatt-hour consumption per capita is increasing steadily. In 1900 the per capita consumption was only a little over 100 kw-hr. and in 1910 it amounted to 530 kw-hr. In 1920 it had increased to 1,075 kw-hr. At the present time the consumption is about 1,600 kw-hr. per capita. Plainly, the saturation point is far from being reached. The constant improvement in electrical machinery and appliances, and the ever widening application to uses in industry, on the farms and in household service, promises increasing per capita consumption in many years to come. Reasonable assumption as to the increase of use combined with careful estimates of the expected population growth offer a fair basis for calculating the probable future growth of load. Fig. 3 presents the outline of a conservative forecast for the state based on such studies and on a correlation of the various competent estimates that have been offered previously. This indicates that in the next ten years the load will be nearly doubled and in twenty-five years the annual consumption will likely reach 25 billion kilowatt-hours.

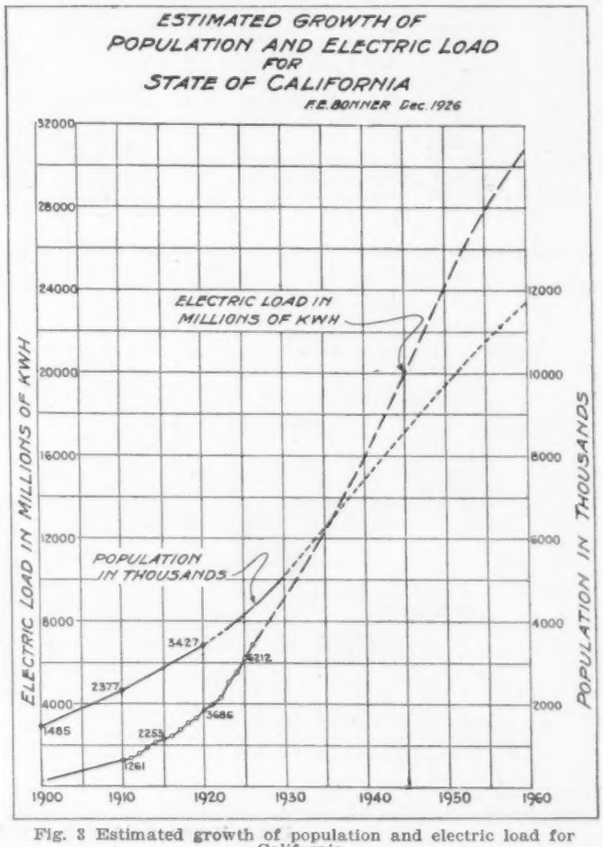


Fig. 3 Estimated growth of population and electric load for California.

Review of Decision in Herminghaus vs. Southern California Edison Co.

By A. E. Chandler
Athearn, Chandler & Farmer, Attorneys, San Francisco

EIGHTEEN years ago the Supreme Court of California decided the case of Miller & Lux vs. Madera Canal Company (155 Cal. 59) and therein laid down the doctrine that a lower riparian owner, whose lands are so situated as to be flooded at the high stages of a stream, may restrain an upper appropriator from diverting any of such flood flow. The stream involved was the Fresno River in the San Joaquin Valley, and the conditions were such that the court held that the flood water after overtopping the banks flowed on as part of the stream.

Two years ago the Superior Court of Fresno County decided the case of Herminghaus vs. Southern California Edison Company, and restrained said power company from storing any of the water of the San Joaquin River, although the flood flow often exceeds 20,000 cu. ft. per second. Herminghaus owns 18,000 acres of pasture land situated on both sides of the San Joaquin River immediately above the confluence of said river with Fresno Slough, which is the northernmost branch of Kings River. A number of sloughs traverse the Herminghaus lands between the San Joaquin River and Fresno Slough. The court found that all of said sloughs, regardless of the stage of river flow at which they carry water, were watercourses heading in San Joaquin River. It further found that the full flood flow of the river was necessary in order to fill the higher sloughs and thereby inundate and irrigate the higher lands. It also found that 180 cu. ft. per second would be sufficient water for the irrigation of all of the land if proper means of diversion and distribution were provided.

Anticipating that the court would rest upon the earlier case of Miller & Lux vs. Madera Canal Company, the power company argued that as an upper riparian owner and as licensee of the Federal government, a riparian owner, it was entitled to store waters at the higher stages of the stream as part of its riparian right. The court held that the riparian right did not include the right to store for future use. It further held, however, that the company could operate its forebays for storage for present use.

The company appealed and was joined by counsel for a number of other power companies as friends of the court. Many irrigation districts, viewing with apprehension the doctrine argued for by the power company, filed briefs as friends of the court, opposing the position of each party to the action. They sought the rejection of the theory that the power company could store for future use as within the exercise of its riparian rights, but contended that it should be allowed to store as an appropriator. In support of the latter contention they asked that Herminghaus be restricted to a reasonable use.

The case was argued before the Supreme Court in January 1926, and reargued in July, 1926. The opinion was finally filed on Dec. 24, 1926. It was written by Mr. Justice Richards and concurred in by four justices. A dissenting opinion was filed by Mr. Justice Shenk.

The opinion affirms the judgment of the lower court. It "holds tight" to the doctrine of riparian rights, especially as reflected in the earlier case of Miller & Lux vs. Madera Canal Company. It sets forth at length the findings of the lower court regarding the sloughs and the necessity for the high river flows, and finds them fully sustained by the evidence. So far as California case law is concerned, the only thing new in the opinion is the definite rejection of the power company's argument that storage for future use is within the exercise of the riparian right.

Many of the briefs before the court presented the view that Sections 11 and 42 of the California Water Commission Act were valid exercises of the police power. Section 11 provides that water in excess of that reasonably needed on riparian lands may be appropriated. Section 42 provides that the term "useful or beneficial purposes" as used in the act shall not be construed to mean the use in any one year of more than two and one-half acre-feet of water per acre in the irrigation of uncultivated areas.

Regarding Section 11, the Supreme Court said:

> In so far as the foregoing portion of said section of said act is concerned it would seem to have no application to the facts of the instant case, since, as we have seen, the trial court has found upon what we deem sufficient evidence that all of the waters flowing in the San Joaquin River down to and upon and over the lands of the plaintiffs herein have been and are being applied to useful and beneficial purposes upon the plaintiffs' said lands riparian thereto and have been so applied by them for more than ten consecutive years last past. . . . .

In considering Section 42 the Court examined at length the subject of the proper excercise of the police power of the state and held that so far as riparian owners are concerned Section 42 is invalid. One of its concluding sentences on this subject follows:

> If the state were here essaying to uphold an effort on its part to work out impartially, unselfishly and in the interests of the whole people some general plan or system for the equitable adjustment of rights and uses in its flowing streams with a view to the conservation, development and distribution of the dynamic forces and generative and fertilizing fructibilities of their waters, it might well be argued that public policy, public interest and a most liberal interpretation of the police powers of the state might rightfully be invoked in support of such an effort. . . .

As the Water Commission Act is the result of a development covering almost forty years in Western water legislation, the above excerpt must be considered a harsh indictment. However, it should be emphasized that the court is referring solely to the provisions of Section 42. No necessary part of the act dealing with either the appropriation of water or with the ascertainment of appropriative rights was before the Court for consideration. The usual rumor is abroad that the opinion declares the whole act unconstitutional, but as shown above the rumor is groundless.

Mr. Chief Justice Waste filed a short concurring opinion in which he said in part as follows:

> . . . . The prevailing opinion, in my judgment, correctly disposes of the issues and balances the rights of the parties to the present litigation under the doctrine of the use of water, which has been developed by an unbroken line of judicial decisions in this state for seventy-five years. I am in entire accord, however, with the view that this doctrine does not best subserve the ends of present requirements and in its application will be entirely inadequate to provide for the future development of the state. The present and future problems arising in connection with the state's most

valuable natural resource can best be met by placing a limitation on its use. A rule that limits the right to the use of water to that which is reasonably necessary for beneficial purposes will best meet these conditions. The state has ample power to enact and enforce such a rule under the police powers reserved to its inhabitants. . . . . .

The dissenting opinion of Mr. Justice Shenk is a forceful attack upon the majority opinion. He argues that Sections 11 and 42 of the Water Commission Act are proper exercises of the police power and "are in line with the declared policy of the state." He shows that the rule that limits the riparian owner to reasonable use is now general throughout the western states, and insists that California should no longer follow Miller & Lux vs. Madera as the Water Commission Act was adopted subsequent to that decision. In referring to the early case of Lux vs. Hoggin which fastened the riparian doctrine upon California, he says:

. . . . But the conditions prevailing over forty years ago when that case was decided were far different from conditions existing at the present time when the growth and prosperity of the state are so dependent upon the proper conservation of the excess waters of its rivers by storage for irrigation and power uses. That the common law, by its own principle, adapts itself to varying conditions and modifies its rules so as to subserve the ends of present requirements was recognized and decided in 1903 in the case of Katz vs. Walkinshaw, *supra*. Rights to the use of real property, heretofore deemed vested, have been curtailed in the interest of the public welfare. It is axiomatic that all property is owned and possessed subject to reasonable regulations under the police power. There is nothing peculiar to a riparian right, which is part of the parcel of land itself, that should exclude it from proper limitations in the interest of the people of the state. It is difficult to conceive of a question more intimately connected with the present and future industrial and economic development of the state than the conservation of the excess waters of its great rivers. . . .

The dissenting opinion contains the following on the practice of the plaintiffs:

The plaintiffs do not pretend to use or to be able to use the great volume of water that flows by their land on to San Francisco Bay in the sense that the term "use of water" is ordinarily employed, namely, for the purpose of sinking into or moistening the soil of their lands. The use they demand is to employ this tremendous flow as a booster or a means of conveyance or of transportation to lift the very small percentage of the flow so useful to them to and over their pasture lands. A more extravagant or wasteful use of water could not well be imagined. Two and one-half acre-feet of water is more than annually sinks into their lands. The balance is excess as to them and so far as they are concerned passes on to the sea and is utterly wasted. This waste is not only contrary to the statutory regulation but it works an injustice to the state which is endeavoring to conserve such waters for useful and beneficial uses by appropriators under the laws of the state. . . .

Mr. Justice Shenk concludes that the injunction should be denied and that the cause should be remanded to the lower court for the purpose of ascertaining the expenditure necessary for proper diversion works. He considers that "the fact that the appellant possesses the power of eminent domain is not a justification for the injunction as ordered."

Water Storage in the Sierra Nevada

Florence Lake Dam and reservoir of the Southern California Edison Company on the headwaters of the South Fork of the San Joaquin River. This multiple arch dam stores water for diversion through the Florence Lake Tunnel into Huntington Lake and thence through the chain of Big Creek plants.

Commercial Leaders Base Optimistic Outlook for 1927 on 1926 Record

FROM Albuquerque, New Mexico, to Victoria, British Columbia, the reports read much the same. The same record of steady, consistent growth and the same optimistic outlook for the future development of electric load characterizes the commercial statement of each power company in the West. If this can be taken as any token of commercial potentialities for 1927, certainly this year will not end without having added to its record a likewise consistent growth in the use of electricity in industry, in commerce and in the home.

It was particularly toward the home that this year's attention was directed. Many companies, realizing that in industrial, agricultural and commercial uses of electricity the field comprised in their territories may be considered well cultivated, have turned their gaze inward to the residential load. In many instances this introspection has revealed an unbalanced load condition, a home consumption per customer very much less than should be considered normal.

COMMERCIAL executives of power systems of the West were asked for comments upon the past year's commercial activity and for some indication of their program for 1927. These men have responded to the request with data and information which should put to rest any misgivings as to the commercial outlook for the new year and in fact for many years to come. Each statement is conservative and yet each is charged with the potential for growth to meet the demands which Western civilization is making upon the industry today.

With particular reference to this situation the editors of Electrical West directed this year's commercial questionnaire to the commercial executives of power systems in the West asking specifically for information on residential consumption. The response to these questionnaires has been almost universal and a large mass of interesting data has been brought together for analysis and interpretation.

Figures for annual kilowatt-hour sales per residential consumer, including electric cooking, water heating, and air heating, vary all the way from 300 to 1,466. It is obvious that a more careful study of these figures will be required. Likewise it is evident that more investigation will be needed into the causes leading up to this divergence of figures. Only by this means may the estimation of the underlying principles necessary for good home load building be made.

Nevertheless, an excellent barometer of the condition of the residential demand in various parts of the West may be found indicated from the figures sent in by the power systems of the eleven Western states and western Canada on range and refrigeration sales. The accompanying table, listing the power systems alphabetically, together with the total number of ranges in service in December, 1926, the number sold last year and the quota of ranges for this year, may be taken as a reliable measure of the residential demand in the territories served by these companies or systems.

Likewise, the refrigeration sales figures for 1926 and those planned for 1927 also give an idea of the merchandising activity of each with this new load-building appliance.

Accompanying the answers to questionnaires returned were a number of exceedingly interesting and revealing letters presenting an analysis of the general commercial situation in almost every district. These comments, made by commercial executives of the power systems in question, give an unanimously optimistic picture of commercial activities during the past year. Almost without exception each points to 1927 as a year for continued activity, larger quotas, greater sales efforts and possibilities, strengthened policies and altogether unprecedented commercial development throughout the West.

Increases Range Total

From Albuquerque. N. M., comes the brief but eloquent statement of Arthur Prager, manager of the Albuquerque Gas & Electric Company. Mr. Prager simply states that his company added 50 ranges to its lines, an increase of 25 per cent over the previous total, and expects to place 75 ranges in its territory during 1927. Although not handling refrigerators last year the company intends to sell 50 during 1927, Mr. Prager declares. This would presage a much more extensive growth in the use of the electric range in this territory, one which has been slower to develop in this respect in the past.

Vancouver Utility Conducted Several Campaigns

At the other extreme limit of the West, British Columbia, the British Columbia Electric Railway Company, serving the Vancouver, B. C., territory, is reported on as follows in a letter from Edmond E. Walker, sales engineer of the company there:

We have had a very successful year during 1926 and while I have not the final figures before me, our returns will show a substantial increase in the addition of new light and power business, kilowatt-hour consumption and the volume of electric appliances sold through our merchandise section.

Successful campaigns have been run in connection with our washing machines and suction cleaners and our electric range sales show an increase over the previous year. We now have 2,600 ranges on our lines.

The outstanding feature of our 1926 merchandising was a cooking school which we put on in co-operation with the Canadian Westinghouse company and The Sun. This school ran for five days in the Hotel Vancouver ballroom, featuring the Westinghouse automatic range, the cooking demonstrations being conducted by our demonstrator, Miss Agnes Read. A total of 10,500 women attended the school and a great deal of interest was created in electric cooking.

In August we opened a new salesroom in the Chilliwack district where we have 1,090 listed customers, Chilliwack being a prosperous little village in the center of a farming district, and our returns have so far fully justified the establishment of another branch showroom, bringing the total number of salesrooms up to seven.

A few months ago we introduced a new electric appliance, viz: Johnson's electric floor polisher, and the sales up to the present time have satisfied us that there is a definite market for this ap-

pliance, and we feel justified in taking this into serious consideration in our plans for 1927.

An active sales effort was made in connection with the introduction of Servel refrigerators in the summer and fall of 1926 with the result that we now have a number of these machines on our lines.

Merchandising plans for 1927 include three campaigns on electric ranges, three on washing machines, two on electric cleaners and two on electric polishers. We also will endeavor to place 50 to 100 refrigerators during the year. This cannot be termed a campaign but will be more after the order of "peaceful penetration."

In addition, there will be campaigns on the smaller appliances such as irons, toasters, percolators, waffle irons, etc., and the indications are that our growth and expansion during 1927 will exceed that of 1926 as Vancouver and the surrounding districts show a steady growth and increasing prosperity.

Power Users Increase in Victoria Region

From the Victoria division of this company also comes a very complete statement. S. J. Walker, manager of the light and power department of the British Columbia Electric Railway Company at Victoria comments on the situation on Vancouver Island as follows:

The past year has been one of steady progress in all departments of the company's operations on Vancouver Island, and the outlook for 1927 is particularly encouraging. A number of plants are now increasing their capacity in order adequately to take care of improved business conditions, and these additional loads aggregating many hundreds of horsepower will be connected to our system early in the year.

The total connected load of commercial motors in Victoria and district is now 31,979 hp. as compared with 27,972 hp. in 1925, an increase of 4,007 hp. The kw-hr. consumption has risen from 22,857,915 in 1925 to 24,525,344 in 1926, a gain of 1,667,429 kw-hr., and gross revenues from power have increased approximately 10 per cent over a year ago.

General lighting shows a reasonable increase. Consumption from this source in 1925 was 12,556,820 kw-hr. and in 1926, 13,275,666, representing an increase of 708,804 kw-hr. Revenues improved about 7 per cent in this class of business. The total number of consumers increased from 16,665 in 1925 to 17,075 in 1926.

At the present time the company is engaged upon a policy of rural electrification and within the near future all scattered communities within reasonable distance of the company's system will be gathered in and will receive the benefits of electrical energy service.

Two retail stores are operated by the company in the City of Victoria doing a business at the present time of approximately $75,000 per annum. A home-service department is maintained, keeping in close touch with domestic consumers to insure the most efficient use of electrical appliances.

A number of campaigns have been put on during the year to popularize and increase the use of appliances and improve lighting equipment. Also a number of demonstrations and displays were arranged for at exhibitions and fairs. The company has issued various booklets and other mailing pieces regularly throughout the year to its customers in order to tie in with the activities of the various departments.

The total capital invested by the B. C. Electric Railway Company on Vancouver Island, including power plants, street railways and the gas department is $10,064,623.40.

Range and Refrigerator Sales and Quotas, 1926-1927

COMPANY OR SYSTEM (Alphabetically listed)	Ranges in Service Dec. 1926	Ranges Sold 1926	Range Quota 1927	Refrig. Sold 1926	Refrig. Quota 1927
Albuquerque Gas & Elect. Co. Albuquerque, N. M.	250	50	75		50
B. C. Electric Railway Co. Vancouver, B. C.	2,600	450	1,000	20	50
B. C. Electric Railway Co. Victoria, B. C.	501	80	120	5	30
California Oregon Power Co. Medford, Ore.		No	Report		
Coast Counties Gas & Elect. Co. Santa Cruz, Calif.	437	160		14	
Coast Valleys Gas & Elect. Co. Salinas, Calif.	550	*240	275	*d*12	*d*36
Deming Ice & Electric Co. Deming, N. M.	20	14	15	5	5
El Paso Electric Company El Paso, Texas	251	130	175	81	200
Great Western Power Co. San Francisco Calif.	3,931	871	1,500		
Idaho Power Company Boise, Idaho	6,828	1,365	1,000	98	300
Montana Power Company Butte, Mont.		No	Report		
Mountain States Power Co. Tacoma, Wash.		No	Report		
Northwestern Electric Co. Portland, Ore.	4,343	1,320	1,500	610	500
Pacific Gas and Elect. Co. San Francisco, Calif.		No	Report		
Pacific Power & Light Co. Portland, Ore.	3,143	479	600	78	150
Portland Electric Power Co. Portland, Ore.	8,531	1,800	2,500	145	300
Public Serv. Co. of Colo. Denver, Colo.		No	Report		
Puget Sound Power & Light Co. Seattle, Wash.	16,731	†5,622	7,500		
San Diego Cons. Gas & Elect. Co. San Diego, Calif.	1,237	361	425	*d*750	
San Joaquin Lt. & Power Corpn. Fresno, Calif.	2,598	687	1,000	58	300
Midland Co. Pub. Serv. Corpn. *s*—Santa Maria, Calif.	646	235	250		
Seattle, Lighting Department Seattle, Wash.	11,027	*3,406 2,776	3,100		
Southern California Edison Co. Los Angeles, Calif.	8,836	2,604	3,000	848	1,500
Southern Colorado Power Co. Pueblo, Colo.	1,290	480	500	60	75
Southern Sierras Power Co. Riverside, Calif.	1,425	230	300	46	75
Tacoma Light Department Tacoma, Wash.	4,780	788	1,000		
Truckee River Power Co. Reno, Nev.	821	18 *d*84	200	6 *d*22	125
Utah Power & Light Co. Salt Lake City, Utah	8,871	1,249	1,915	167	300
Washington Water Power Co. Spokane, Wash.	9,000	1,100	1,200	160	320
Western States Gas & Elect. Co. Stockton, Calif	461	57	75		
Totals	99,108	26,656	29,225	30,495	34,644

Key: *—Combined power company and dealer sales. *d*—Dealer sales alone. †—Sales for eight months only. *s*—Subsidiary of San Joaquin Light & Power Corporation.

Coast Companies Show Increases

The Coast Counties Gas & Electric Company's report was confined to the questionnaire answers. Nevertheless, it is known that this company has been active for the past year in range and refrigeration sales and will probably continue an active policy along these lines during 1927. This company serves the Santa Cruz, Watsonville and Gilroy territory in central California.

P. S. George, manager commercial department of the Coast Valleys Gas & Electric Company, serving the Monterey and Salinas valley districts in central California, in his letter announces that new quarters are soon to be acquired by his company from which an active merchandising program will be carried on. He says in part:

We had approximately 550 electric ranges in service in December, 1926. During 1926, 240 ranges were sold through dealers and direct by us. We have established a quota of 275 ranges for the year 1927.

Electric refrigerators sold in 1926 entirely by dealers are estimated at 12. The electric refrigerator quota for 1927 is estimated at 36.

As you probably know, this company plans on moving into new quarters in four or five months, and it is expected at that time that we will enter the merchandising business. Up to the present, however, we have confined our sales entirely to ranges, water heaters and air heaters in co-operative selling with dealers.

During 1926 we conducted two special campaigns, one during the month of Oct. 15 to Nov. 15, selling at a special price Ever-

hot fireless cookers. Approximately 200 were sold during this period simply by advertising and direct-mail broadsides. During the month of December we co-operated with the Edison Electric Appliance Company in a range sales campaign in which we gave a Hotpoint waffle iron and tray with every range sold during the campaign. We succeeded in selling 46 ranges for immediate installation, or a total of 345 kilowatts. Sixty-seven per cent of the ranges installed in December sold for $130 or more, leaving about 33 per cent of the cheaper models.

Further Activity in the Southwest

From Deming, N. M., with the Deming Ice and Electric Company serving only 429 consumers, comes a very fine record of 14 ranges sold during 1926, bringing the total up to 20. A quota of 15 ranges and of 5 refrigerators for the year, according to the letter of K. W. Kessick, manager, indicates a growing strength in this field.

Another section of the southwest which has long been noted for its active merchandising and sales activity is the territory served by the El Paso Electric Company of El Paso, Tex. W. R. Bell, general superintendent of the light and power department tells of unusually fine results in small appliance campaigns:

Our merchandising activities for 1926 were very successful and we increased our appliances sales 26 per cent over 1925. Our 1927 bogey calls for an increase of 24 per cent over our 1926 figures. The general plan followed in our appliance merchandising is to conduct a special sale each month on some appliance. These sales are arranged so that, as far as possible, we tie in with the National Electric Light Association appliance campaign plans.

We have also found that special one-day sales are an excellent means of selling medium-priced appliances in bulk. A good illustration of this was our Excel cooker sale held on March 17 at which time we sold 86 cookers. Another instance of the success of this method was our waffle iron sale which was held on July 29, when we sold the 24 waffle irons placed on sale before 12 o'clock.

Our total customers connected to the lines were increased during 1926 5 3/10 per cent. Our kw-hr. sales for 1926 were approximately 20 per cent over 1925, and our gross revenue, 13 2/10 per cent over 1925.

Idaho Power Claims Thirty-two Per cent Saturation

"Thirty-two per cent of our lighting customers cook with electricity," writes J. F. Orr, sales manager, Idaho Power Company, adding that his company now serves 6,828 electric range customers, of which 1,365 were added in 1926. One thousand more are set for the 1927 quota with 300 refrigerators at this year's bogey also.

Great Western Declares Year Best in History

With the acquisition of the Napa Valley Electric Company system during the past year and an expanded commercial program in all departments the Great Western Power Company of Californna, according to F. H. Woodward, general sales manager, enjoyed one of the best years commercially in the history of the company. He states, in fact:

We have just closed the best year in the history of the company from the standpoint of the acquisition of new business. During the twelve months ended Dec. 31, 1926, our contracted business reached a total of 10,046 new meters, representing a load of 48,947 kw., part of which has not yet been connected.

Business actually connected to the lines totaled 38,405 kw., representing the requirements of 8,371 consumers. As of Dec. 31, 1926, the total connected load on the company's system was 555,838 hp. with 63,383 consumers. In addition, the Napa Valley Electric Company system, acquired in June, 1926, serves a connected load of 2,774 kw. to 1,203 consumers in the towns of St. Helena, Rutherford, Oak Knoll and Yountville.

During the year the sale of electric equipment totaled 871 ranges, 331 water heaters and 695 air heaters together with 738 kw. of heavy duty equipment.

Our 1927 quota has been placed at 1,500 ranges, 500 water heaters and 1,000 air heaters. Our merchandising policy, with the exception of a few minor changes, will remain the same; that is, direct sales effort and co-operation with dealers under general office supervision. Sales of kilowatt-hours for 1926 to all classes of consumers exceeded sales during the previous year by approximately 10 per cent.

Northwestern Lamp Campaign Success

"Concerning the commercial progress of this company in general for the year 1926, the following brief sketch may give you some data for the year," writes J. C. Plankinton, sales manager, Northwestern Electric Company of Portland, Oregon. He continues:

In the spring of this year we conducted a commercial lighting campaign, selling a total of 335 units, adding approximately 49 kilowatts on commercial lighting load, representing $2,100 estimated annual revenue.

One other campaign that we considered somewhat of an achievement for this company was our employees' Mazda lamp campaign conducted during the month of November, 1926. During this time we sold a total of 17,878 60-watt inside frosted lamps through direct-mail and employees selling. The significant fact in this connection is that this company had never sold Mazda lamps in its principal district, that is Portland, before this campaign. The gross profit on this venture was approximately $180. We estimate that there was added in the neighborhood of 180 kilowatts of connected load, and this added load would undoubtedly bring in a considerable amount of additional revenue each year. Further, the campaign we feel was educational in that it introduced the new inside frosted Mazda lamps in the homes of our customers in a much shorter time than would have been required in the ordinary course of events.

All Appliances Forced by Pacific Power and Light

Another company serving in Oregon, the Pacific Power & Light Company, has had a similarly successful season. If anything its merchandising activities rank among the most effective in the Western territory. In sending a report by V. H. Moon, appliance sales sunperintendent, George C. Sawyer, sales manager of the company declares that it pleases him to be able to advise that business conditions generally have been reasonably satisfactory in the territory served by his company during the past year.

Our residential customers show an increase of 2,925 or 9.1 per cent; commercial customers an increase of 450 or 6.6 per cent. During the year we connected 8,000 kw. additional to our lines. Increased annual revenue from new business secured is estimated at $164,331.

Merchandising activities are covered in the attached copy of letter prepared by V. H. Moon, our appliance sales superintendent.

Mr. Moon's letter goes into a comprehensive detail of the company's appliance selling program:

In nearly every line of appliance sales with our company the year 1926 has showed an increase over the previous year. A resume of our activities in chronological order is as follows:

From Jan. 15 to March 1 we conducted our third kitchen lighting campaign, which resulted in 2,376 sales, amounting in gross value to approximately $16,000. This should bring an annual revenue of $8,300 according to our statistics.

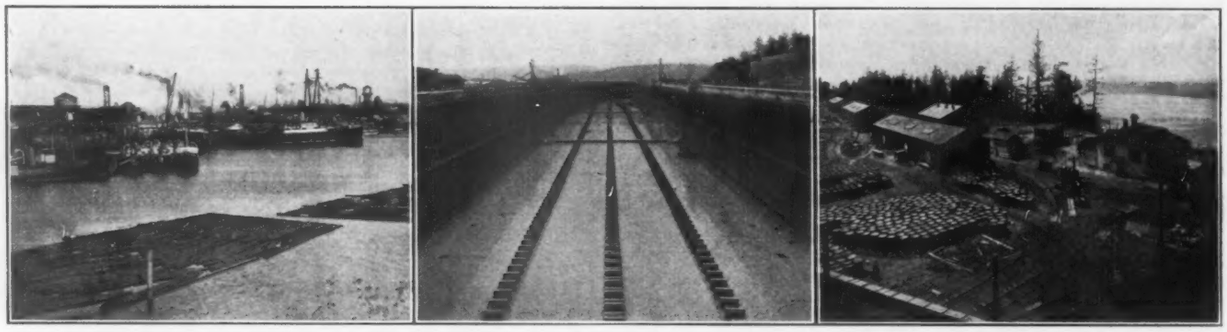
A window lighting campaign was conducted from Feb. 15 to June 1. This resulted in the sale of 581 window lighting units and a gain in wattage of 118,826 kw. Considering that this business is worth $75 per kw-yr., we should expect an increased revenue of $8,911.95 from this new business.

From March 1 to 31 we conducted a spring campaign on washers and ironers in which 81 units were moved for a gross of $12,374.50. Revenue from this type of device is small and this campaign is probably worth not to exceed $400 a year increased revenue.

April 1 to 30 we conducted a vacuum cleaner campaign in which 215 cleaners were sold for a gross business of $15,089.30. The results of the cleaner campaign were not as good as in previous campaigns due to the fact that we were rearranging our selling plan on vacuum cleaners. The revenue from this campaign may be considered as negligible.

From May 15 to June 1 an electric range campaign was in effect which resulted in the sale of 259 electric ranges. This is by far the best range campaign we have had to date, and for the limited exclusive electric territory is considered a good record. This resulted in a gross business of $36,000 and an annual revenue of $12,950.

During the spring and summer months special attention was given to refrigeration. While the number of refrigerating units sold is not large, amounting to 76, the gross business amounted to $21,757.86. It is considered a good start. Revenue from these units should equal $1,140 on the basis of $15 per machine per year.



The Canadian Puget Sound Lumber & Timber Company, Ltd., Victoria, (left) has a connected load of 1,111 hp. and will have a load of 355 hp. added during 1927. The new Songhees Drydock at Esquimalt, B. C., (center) which has a connected load of 3,775 hp. including electrically operated pumps totaling 1,000 hp., discharging 63,000 gal. per min. which empty the basin in 3½ hours. The buildings (right) are the power house and transformer house. The storage sheds of Canadian-Grant, Ltd., James Island, B. C., (right) manufacturers of explosives. This company is served by submarine cable from the B. C. Electric's Vancouver Island system.

From Aug. 1 to 30 a special was offered on flat irons and 459 irons were sold in that period.

Beginning Sept. 1 our company conducted its first campaign on the sale of Mazda lamps by campaign methods. This effort lasted from Sept. 1 to Dec. 31, special effort being made during the month of September. With sales figures received up to approximately Dec. 1 we have sold 40,449 lamps for a gross of $12,134.70, or 32.2 cents per customer. Our records show that our lamp sales this year are more than doubled, in fact during the period of this campaign we sold two-thirds of the lamps sold during the entire year.

Beginning Oct. 15 the Thor washing machine campaign was conducted for a month, which resulted in 332 sales for a gross business of $56,244.15. Revenue from the sale of these machines would probably not greatly exceed $1,000 per year.

During the month of December a special Christmas campaign was conducted, featuring all appliances and Hotpoint ranges in particular. Results are not yet available but we can depend, I believe, on our sales at least equaling those of last December. A Christmas booklet was produced as during December of last year.

The above covers briefly the major activities during 1926. In 1927 several campaigns are planned which will be of a commercial nature. An activity on electric signs will be launched some time during January or February. Socket powers will be sold during March, and other lighting and commercial activities will be planned for some months during the year.

Big Range Year for Pepco

The third company in the Portland territory, the Portland Electric Power Company, also enjoyed a banner year, but more especially in electric range sales. As will be seen in the table on the first page of this article the range sales for the year are given as 1,800. Of this item, A. C. McMicken, general sales manager for the company, has this to say:

Unfortunately, we are able to give you but the answers applying to the Portland division, which includes the City of Portland, Oregon City, St. Helens, Gresham, Sandy, Troutdale and a few other small towns and the intermediate territory.

I think further explanation should be made of the answer to the question: "How many electric ranges were sold in 1926?" The Portland division took orders for exactly 1,800 ranges. It was not possible to deliver and install all of these ranges by Dec. 31, as the residences or apartments were not ready to receive them. We actually installed and connected 1,589. Dealers, both electrical and non-electrical, and persons moving into the city owning ranges, brought the net gain in number of ranges in the Portland division up to 1,972. This would indicate that 383 ranges had been sold by house furnishers and electrical dealers during the year. Or, if you consider that we sold 1,800 and dealers 383, then the number sold during 1926 on our lines would be 2,183 ranges.

Puget Sound Company's Range Campaigns Make History

H. J. Gille, general sales manager, Puget Sound Power & Light Company, has declared that statistics on 1926 sales and consumption will not be available on that company's system in time for publication in this number of Electrical West. However, it is known from published accounts of two range campaigns (see Journal of Electricity, Aug. 1, 1926, p. 91 and Electrical West, Jan., 1927, p. 14) that the company exceeded all previous records in range selling this year in spite of a high percentage of saturation.

San Diego Company Experiences Healthy Growth

Figures based upon the twelve months ending Nov. 30, point to a very favorable condition of growth for the San Diego Consolidated Gas & Electric Company, according to A. E. Holloway, superintendent commercial department. He goes on to say:

Our company has enjoyed a very healthy growth during 1926, with an increase of 6,910 electric customers, or approximately 13.3 per cent increase for the year. The kw-hr. sale increase for the same period was approximately 18.7 per cent. The connected load in kw. increased 9 per cent and the kw. in power load connected showed an 8 per cent increase during 1926.

The past year has been one of considerable building activity for the business district of San Diego, seven large office and hotel buildings having been under construction. One of these buildings is the new Spreckels Building, with a connected load of 934 kw. in lighting and 767 hp. in motors.

The electric heating business has shown a very steady increase, with sales in excess of one dozen commercial electric bake ovens, the largest of these being a 240-kw. traveling oven for a bakery and two automatic shelf ovens with a connected load of 72 kw. The agricultural and industrial power loads have shown a normal and satisfactory growth.

During 1926, 1,300 new street lights were installed and turned on in our territory, or an increase of 30 per cent. Ten hundred and ninety-two of these new lights were of the ornamental type, illuminating various business centers of San Diego and surrounding towns. There has been an increase of 80 per cent in ornamental street lighting during the past year, lighting over ten miles of business streets.

The Christmas holiday sales of electric appliances, as reported by electric dealers and jobbers, are the greatest of any year so far. Practically all retailers' and jobbers' stocks were sold out completely.

The companies handling electric refrigerators report excellent sales, and the reports from the various electric refrigerator dealers show that a total of approximately 750 machines were sold during 1926.

The year 1927 seems to hold good prospects. There are now under petition, or under process of installation, more than 850 ornamental street lighting standards which will be installed during 1927.

Several large business blocks, apartment hotels and theatres are planned and will be under construction or completed during 1927. Electric refrigerator dealers report that they expect to double the sale of electric refrigerators for the coming year. On this basis they figure there will be sold in San Diego approximately 1,500 machines. Electric range and water heater sales are expected to be at least 50 per cent greater than last year, during which time 361 ranges and 129 electric water heaters were sold.

San Joaquin Company Issues Sales Newspaper

A. M. Frost, manager of sales, San Joaquin Light & Power Corporation, has an excellent and most complete report to present for the year 1926. It goes

into the load increases of both the San Joaquin Light & Power Corporation and of its subsidiary, the Midland Counties Public Service Corporation, and details the sales school work, the methods used in assigning individual bogeys to salesmen and much interesting data concerning this year's plans. His report is worth a careful perusal and study as to whether similar methods may not be found efficacious in other commercial departments.

In the first eleven months of 1926, the San Joaquin Light & Power Corporation, and Midland Counties, have added the following load:

Lighting	5,186 kw.
Domestic and commercial, electric range water heating and air heating	12,714 kw.
Industrial power and oil field power	17,263 hp.
Agricultural power	31,173 hp.

There were 15 power salesmen employed by the San Joaquin and Midland Counties in their various districts, and 19 employees of the Valley Electrical Supply Company, each of which took the lighting and power sales courses of the National Electric Light Association. The courses have been finished and certificates of graduation will be presented at the next sales meeting. All of the men taking the courses passed with grades of over 90 per cent.

It is intended to carry on our sales meetings during 1927 as we have during the past year, though the features of each program have not yet been worked out.

It is expected that the following increases in the various classifications of business will result from our 1927 efforts:

Lighting	5,092 kw.
Domestic and commercial, electric range, water heating and air heating	12,041 kw.
Industrial power and oil field power	16,220 hp.
Agricultural power	29,010 hp.

It is anticipated that in 12 months after connection, this amount of business will result in a gross earning of $1,400,204.

Our program for consumer extensions will involve an expenditure of approximately $2,000,000.

Each one of the district salesmen has been given a bogey in each classification of business to reach during the year. The total bogey for the salesmen is 28,750 kw., which it is anticipated will result in a gross earning of $179,649.82 in 12 months after connection.

The annual bogey of the salesmen has been divided into twelve parts and pro-rated into classifications and kilowatts in the proportion in which we anticipate the business can be secured monthly.

On the form (Fig. 1) that we intend to use for this purpose you will note that the upper half of the sheet is used for the bogey charged to each salesman, and that the lower half will show his monthly performance on that bogey.

Lighting Department

The City of Seattle through its superintendent, J. D. Ross, merely reports its range sales and other statistical data. For its 74,616 customers it had in service on Dec. 31, 1926, a total of 11,027 ranges, of which 3,406 were connected in 1926. Of these the city sold 2,776. For 1927 a range quota of 3,100 has been set. As yet the city does not merchandise electric refrigerators.

Edison Company Makes Refrigeration Fact

Both in range and refrigeration campaigns the Southern California Edison Company experienced favorable commercial increases during 1926. With an ample surplus of power from its new steam plant units available, commercial activity was resumed by this company upon a firm basis. W. L. Frost, general commercial manager of the company, sums up the situation in these words:

During 1926 Southern California Edison Company made electric refrigeration an established fact on its system by selling 848 refrigerators and a thorough campaign of education which will be productive of splendid results for some time to come.

The most outstanding feature in connection with range sales for the year was a campaign conducted for five weeks in November and December during which time 650 ranges were sold.

In 1927 we plan to sell just one make of refrigerator which should be of distinct advantage to our customers and only serve to stimulate business for those handling other makes. The same idea has been adopted with regard to vacuum cleaners.

The sale of lamp socket appliances will be pushed vigorously but so far we have formulated no special plans for this end of the work.

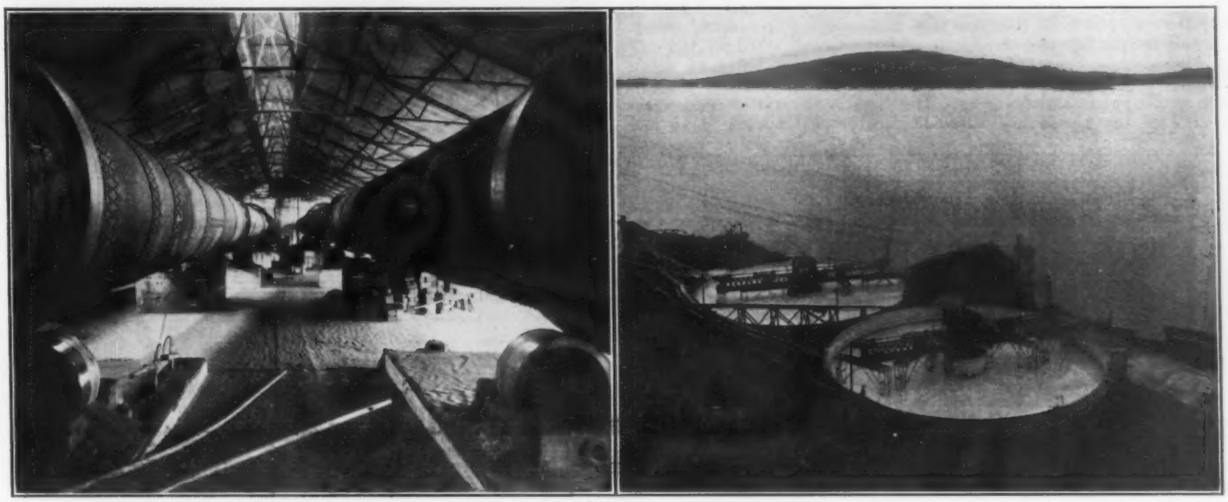
Southern Colorado Power Shows Growth

A steady increase in the use of electric ranges is evident from the figures submitted by E. F. Stone, assistant general manager of the Southern Colorado Power Company, of Pueblo, Colo. Last year the company opened an attractive new show room and sales headquarters in Pueblo, from which it is expected greater commercial activity will result during 1927. The company, however, sold 480 ranges and 60 refrigerators and has set its mark at 500 ranges and 75 refrigerators for 1927.

Adds to Lighting and Heating Loads

Declaring that his company can report no outstanding commercial achievement, George T. Bigelow, assistant general agent for the Southern Sierras Power Company, nevertheless reports substantial increases in load, particularly in lighting and heating. He says in part:

It is hard for me to give you any outstanding commercial features as we do not do anything of a spectacular variety in cam-



The B. C. Cement Company at Bamberton, B. C., uses over a million kilowatt hours a month on an average for the year around. The picture at the left is of the revolving kilns, 185 ft. long and 8 ft. 9 in. in diameter, electrically driven. At the right are seen the mixing pools where the "slurry" is kept constantly stirred by means of the revolving paddles and bridge. The mixer is electrically driven.

paigns on our system. We have shown an advance of between 16 and 17 per cent in kw-hr. this year, and an advance of between 19 and 20 per cent in revenue, which I feel is quite satisfactory.

For lighting alone we have increased over 21 per cent in kw-hr. use and in heating alone 18 per cent. The only special campaign that we put on was with the electric cookers, and in this campaign we were able to sell about 5 per cent of our residential consumers. In other lamp socket devices we made no marked gain as we did not push them. The major portion of our effort was thrown to ranges, water heaters and refrigerators, and I believe that our average of 495 kw-hr. per home is good evidence that it has been worth while.

The increase in our consumers has been between 9 and 10 per cent.

The City of Tacoma Light Department according to a letter from Llewellyn Evans, superintendent of the electric works, placed 788 new ranges on its lines during 1926, bringing the total up to 4,780 ranges for a served population of 29,210. For 1927 a range quota of 1,000 has been set. Little activity in electric refrigeration is reported from this territory.

In the district served by the Truckee River Power Company of Reno, Nev., with a residential consumer list of 6,310, the number of ranges for the system, up to the first of the year was 821. During 1926 the company sold 18 ranges of this total, and the dealers of the territory, active merchandisers, sold 84. A total range quota of 200 has been set for 1927 with dealers and power company co-operating to reach this bogey. Likewise in electric refrigeration sales the dealers proved active, selling 22 units while the company sold 6. A quota of 125 has been set for this year on this appliance.

Washington Water Power Rates Reduced

Although the report of Lewis A. Lewis, sales manager of the Washington Water Power Company of Spokane, is a conservative and modest one, that company's commercial activity for the past year has been no less significant. In its lighting campaigns especially it has established precedents. Mr. Lewis' letter sets forth the following facts:

The gross merchandising revenue for Spokane for 1926 was $265,458.42, or an average of approximately $11 per residence customer. I cannot point to any outstanding achievement for 1926. The announcement of the Sullivan Mining Company, one of our large Coeur d'Alene mining customers, that it will erect and operate an electrolytic zinc smelter is of outstanding importance to us.

The reductions in our rural and city lighting rates, being a reduction in many cases of from 15 to 8 cents per kw-hr., is quite important.

Merchandise is aggressively sold as in the past year with an increase in the number of appliances placed, but on account of receding prices, the revenue did not equal that of last year. Eleven hundred ranges were sold and 160 domestic refrigerators. Three successful lighting campaigns were conducted, two kitchen lighting and one commercial lighting. Special inducement sales on small appliances were conducted monthly by the post card order system. All resulted very satisfactorily. The most successful of these sales was with the percolator, where a local coffee roaster gave one pound of coffee free with each percolator sold. A mid-winter range campaign under the manufacturer's plan of "What Every Mother Wants" resulted in the sale of one hundred electric ranges for the month, proving conclusively that the electric range is not a seasonal commodity.

Our plans for 1927 do not vary from 1926 to any extent. We will conduct a house-to-house campaign on kitchen units and lamps in cartons during January and February; a residence lighting campaign in the fall of the year; an intensive commercial lighting unit campaign in October and November and an industrial lighting campaign during the early part of the year. Two range campaigns will be conducted during the summer months. It is my opinion that vacuum cleaners and washing machines are more successfully sold on a continuous basis by an entirely separate sales organization from that of ranges and other devices, and while the sweeper is being conducted on that basis now, we hope to organize our washing machine sales crew early this year.

Western States Merchandising Store Delayed

In last year's commmercial report, published in the Feb. 1 number of Journal of Electricity, announcement was made of the Western States Gas & Electric Company's plan for the establishment of a merchandising store in Stockton, in conformity with the policy announcement of the Byllesby Engineering & Management Corporation. Events have come to pass to delay the opening of such an establishment, however, in the Stockton district.

In this year's report H. F. Griffin, superintendent of the commercial department, merely states range figures for that company's system for 1920 and 1926. In December, 1920, there were 200 electric ranges in service on the company's lines. In December, 1926, there were 461 ranges in service, or an increase of more than 120 per cent. During 1926, 57 ranges were sold in the territory, which is also served with gas by this utility. The 1927 quota calls for the sale of 75 ranges. Refrigerators were not handled last year nor is there intimation that they will be handled during 1927.

Utah Power Plans Several Campaigns

Just before going to press the following letter containing the commercial story of the Utah Power & Light Company came in from R. H. Ashworth, assistant to the commercial manager. It shows that company to be an active and persistent merchandiser with a good record and a consistent plan for this year. Excerpts from the letter follow:

During the past year, and as we now plan for 1927, our merchandise activities will be carried along the same lines they have been in past years. During 1926 we tied in with the various programs and campaigns of the National Electric Light Association in connection with special campaigns on percolators, toasters, irons, etc. In addition to this, we carry on each year a special washing machine campaign during the month of March, during which month we ordinarily sell from one thousand to fifteen hundred washing machines, and shortly after this we undertake our summer electric range campaign and also a campaign on electric refrigeration. During 1926 we put on a special range campaign durng the month of December, stressing this particularly in connection with holiday trade and in connection with which campaign we secured very satisfactory results in the matter of placing additonal ranges on our lines.

SALESMAN_____

DISTRICT_____

BOGY FOR 1927.

Month	Salary for Month	Auto Exp. for Month	Misc'l. Exp. for Month	Total Exp. for Month	Domestic, Commercial & Street Lights K. W.	Monthly Rev. @ $31.00 per K. W.	Domestic & Commercial Combination Service K. W.	Monthly Rev. @ $19.00 per K. W.	General Power K. W.	Monthly Rev. @ $12.50 per K. W.	Agricultural Power K. W.	Monthly Rev. @ $14.00 per K. W.	Total Monthly K. W.	Total Rev. per Month All Classes	Cost per K. W.	Cost per Dollar of Revenue
January																
February																
March																

SIGNED FOR 1927

Mont	Salary for Month	Auto Exp. for Month	Misc'l. Exp. for Month	Total Exp. for Month	Domestic, Commercial & Street Lights K. W.	Monthly Rev. @ $31.00 per K. W.	Domestic & Commercial Combination Service K. W.	Monthly Rev. @ $19.00 per K. W.	General Power K. W.	Monthly Rev. @ $14.00 per K. W.	Agricultural Power K. W.	Monthly Rev. @ $19.00 per K. W.	Total Monthly K. W.	Total Rev. per Month All Classes	Cost per K. W.	Cost per Dollar of Revenue
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February																
March																

Fig. 1. Salesmen's Bogey and Accomplishment Record, San Joaquin Light & Power Corporation.

Ideas for the Contractor

Sacramento Sawmill Uses Underground Conduit

Contractor Opens for Himself New Field as Specialist in Direct Connected Motorized Machinery of All Kinds

OVERHEAD clearances were accidents of unusual circumstance and sheer good luck in the "good old days" before electric motor drive in sawmills and planing mills. With a central power plant operated from steam engines, fed from boilers in turn burning the waste sawdust of the plant, the roof rafters of every part of the plant were loaded with shafts and pulleys extending over all portions of the ceiling. The spaces between machines not occupied by pillars to support this enormous roof load were filled with clacking belts, singing a giddy song of danger to all who might come within striking distance of them.

But times have changed. The modern woodworking plant is a model of cleanliness. Its roof space is free of whirring shafting. There is more light from cleaner skylights and more air to breathe. Blowers carry off the dust-laden air as well as the chips and sawdust exhausted from the machines. Fewer roof supports are required because those remaining have only a roof to support. This makes for wider clearances between machines and plenty of danger-free room in which to handle the lumber.

The Moore and Garlick Planing Mill, located in Sacramento, Calif., and wired by Clifford Prudhomme, Electragist of Sacramento, is that sort of mill. And to carry on still further the absence of overhead apparatus all wiring for the machines and controls has been carried in conduit placed underground or under the floor.

As may be seen by the illustrations at the bottom of the page the installation was handled in a farsighted and workmanlike manner. The main switchboard was made large enough to accommodate future demands. An exceptionally large gutter is used with it. The gutter is 10 x 7 in. deep, allowing not only room for expansion but also plenty of working space within it.

The main service cable is of 500,000 circ.-mil. A 400-amp. main service switch is employed, serving a number of smaller switches as required for the individual machines.

In order to obtain speed and insure smoother work from each unit, every machine is not only individually motor equipped but likewise direct connected. In older types of installations, even with individual motor drive, belts slipped and caused more or less trouble. To eliminate these difficulties the direct connected motor applications were employed throughout.

Overload no-voltage releases are connected to all motors. On one machine, known as the sticker, five motors are used. A small hand blower, motor driven, is available also for use in blowing dust from the machines and around the motors.

Clifford Prudhomme, the electrical contractor responsible for the installation, is making a specialty of industrial work such as with this plant, in Sacramento and surrounding territory. It is his theory that the electrical contractor may not alone install such equipment as that in this planing mill, but may expand into a dealer of that sort of motorized equipment himself. He becomes then, not merely an installer but an electrical industrial machinery specialist and dealer.

It Stands to Reason

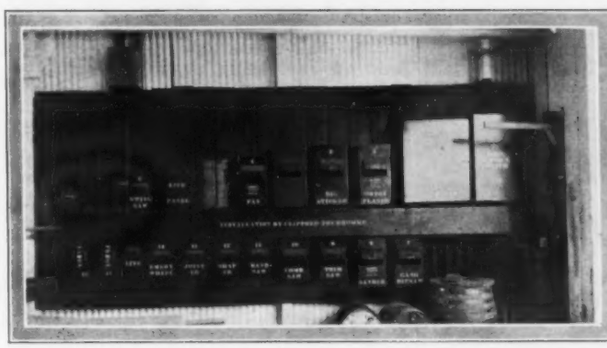
AN ELECTRICAL contractor of many hard knocks and more years of practical experience was speaking—"It stands to reason that if a contractor gets only half as many jobs and makes 10 per cent profit on them, or even a quarter as many jobs and makes 20 per cent profit, that he will be far better off than if he took everything that came along and got only 5 per cent.

"There is just so much worry, risk, and pure cussedness to every job. If you take a hundred jobs a year, or a month, you will have a hundred times that much grief for the bunch. So, if you figure only 5 per cent profit on that hundred it stands to reason you'll have twice as much grief as if you only got fifty jobs or a quarter as much as if you had only twenty-five jobs.

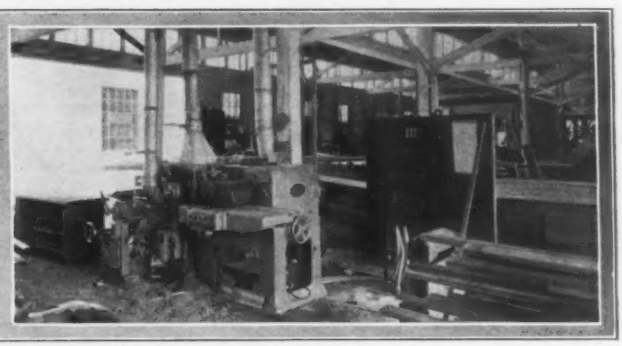
"Chances are that if you get only twenty-five jobs and figure 20 per cent profit on them all, you will live twice as long and be a whole lot happier. There's not much in this being a pig. You can't do all the jobs in the world no matter how hard you try. You'll get less headache doing a few jobs well and being paid for what they are worth than getting thin and eating two-bit meals trying to gobble everything that is put up and doing the work for charity.

"My motto from now on—and it has taken me a lot of years to acquire enough sense to see it this way—is to let the low price boys load up on all the 5 per cent stuff they can get. They're welcome. Let them go broke if they want to. What I want, and I believe I can get, are fewer and better jobs. I'd rather take a chance on keeping the wolf away in an easy-going, dignified manner than getting killed in the rush for quantity production that produces nothing for me."

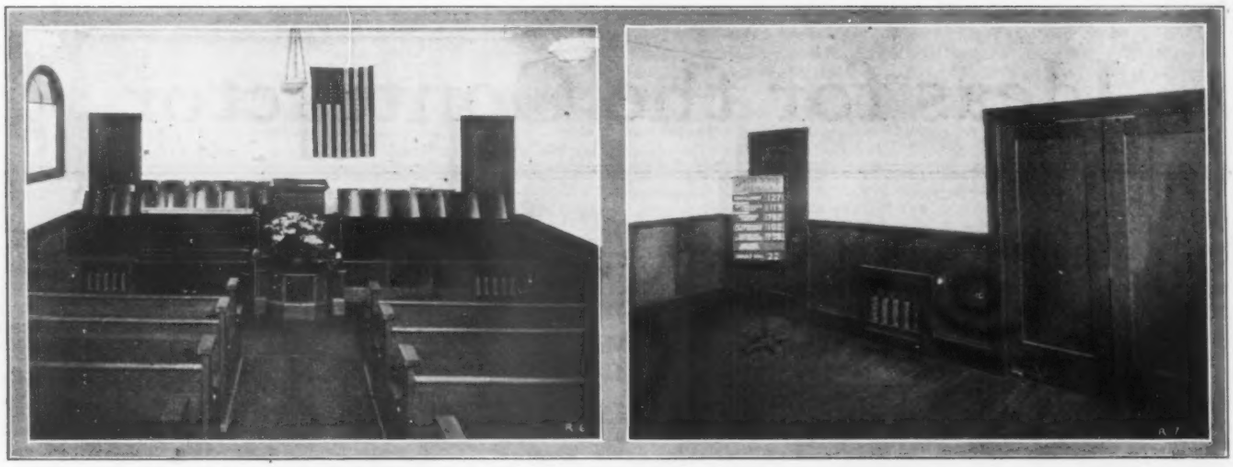
With these words the contractor drew forth a letter written by a customer in which were these words, "Your bid is the highest of the lot, but I am inclined to give it to you just for that reason. I know what kind of job I can expect from you and I'm willing to pay for it."



An especially large gutter was provided in this switchboard in order to give working space and allow for plant expansion. The board is nicely stencil labeled to conform with plant machine units.



The sticker, a woodworking machine requiring five motors, all direct connected. The control panel at the right connects with the machine through the floor giving all possible clearance.



Electric heaters are inset under the platform of this small church near Richmond, Calif. Other heaters are inset in the walls. Electric heat is ideal for heating auditoriums in which large numbers congregate.

Small Church Ideal Place for Electric Heating

Actual Test Shows Operation to Be Economical, Cleanly and Convenient as Well as a Good Will Builder

AN ESPECIALLY good off-peak load in electric heating is provided by the small church such as may be found in all communities. Aside from the fact that electric heating is an ideal form of heating for an auditorium in which a large number of persons congregate, from the contractor and power company angle the electric heating of small churches of the kind mentioned provides the type of installation and load which are highly desirable from a good-will angle.

When it is demonstrated that an auditorium may be heated adequately by means of electric heat those who experience this demonstration every week at their church are in a frame of mind to be influenced to attempt heating their homes by the same cleanly and efficient means.

The First Presbyterian Church of Stege, a small community near Richmond, Calif., has such an installation and according to the meter and billing records operates its electric heating on a very economical basis throughout the year. In spite of the fact that the church is used only on one or two occasions during the week this fact has not proved to the detriment of electric heating in this type of application.

As shown in the photographs at the top of this page air heaters are installed flush with the front of the platform and with the walls of the auditorium. The total air-heater load is 27.6 kw. Besides this a 7.5-kw. range and a 5-kw. water heater, on a double-throw switch, are also used in the social hall of the church, making a total connected load of 39.8 kw. The church is served by the Western States Gas & Electric Company whose rate for the lights, range, water heater and air heaters is as follows:

First 30 kw-hr.	$ .07
Next 150 kw-hr.	.033
All over 180 kw-hr.	.016

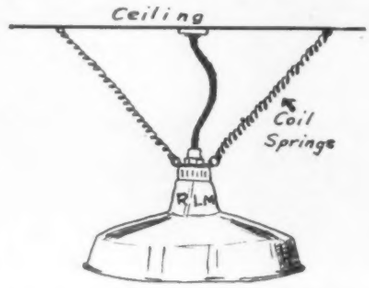
As will be seen by the accompanying table the average bill amounted to only $9.30. During winter months the bills will be seen to run as high as $17.

Following is a table showing the consumption and billing for each month during the period of one year:

Date of Reading	Kw-hr. Consumed	Total Bill
Dec. 24	768	$15.02
Jan. 24	552	11.91
Feb. 26	336	8.81
Mar. 26	384	9.49
April 26	432	10.19
May 26	288	8.12
June 26	216	7.08
July 29	72	3.34
Aug. 28	192	6.73
Sept. 26	96	4.07
Oct. 26	408	9.84
Nov. 28	912	17.10

Ingenious Lamp Suspension Kills Effect of Vibration

Where excessive vibration from the working of heavy machinery so jars lighting installations as to shorten materially the life of the lamps in use, an ingenious plan used with success by the Acme Electric Company of Long Beach in the U. S. Tool Company plant located at 3006 Cherry Boulevard, may be employed with good effect.



Means of suspending reflector to eliminate vibration and lengthen lamp life.

Instead of fastening the R.L.M. reflectors rigidly to the ceiling outlets, as many such installations are made, the reflectors in this case are suspended by two coil springs on either side of the lamp and the short connection between the outlet box and the reflector is wired with No. 14 R.I. reinforced cord. In this way the lamp is not subject to the vibration, or the effect of vibration of the building. Lamps used are 500 watts.

The wiring in every case is heavy enough to put in 1,500 or 1,000-watt lamps if it becomes necessary. The U. S. Tool Company manufactures oil drilling equipment, which type of work is very heavy, so the vibration is considerable. The method of suspension illustrated kills the vibration from the machines. Since making this installation the cost of lamp maintenance has been reduced considerably. The company does a great deal of export business in Europe, Russia and India. There is approximately 250 hp. connected in motors, one a 25-hp. motor and the rest being mostly 7½ and 10-hp. Motors of the ballbearing type are used.

Each machine in the plant is magnetically controlled and has a convenience outlet located near it to accommodate an extension cord which is used to inspect a particular piece of work or for doing close work.

Three distributing centers serve the building, one a main switchboard and two subboards. Brown & Pengilly boards were used in this installation. They are of the dead-front type, front-connected to conserve space. All motors are on 440 volts.

No Need to Pass Up a Real Chance for a Red Seal Bid— Make An Alternate Bid, Too

The Red Seal Plan of Electrical Wiring

The Symbol of Adequate Wiring—Copyright 1926, by The Society for Electrical Development, Inc.

Guarantees to the Owner

First —An economical installation.
Second—Adequate for the full enjoyment of Modern Electrical Convenience.
Third —Inspection by the California Electrical Bureau, certifying on record, that **RED SEAL** requirements have been met.

Alternate Proposal

The incorporation of the following additions and changes will raise the specifications to meet **RED SEAL** requirements:

_____

_____

_____

_____

_____

This complete **RED SEAL SERVICE** may be enjoyed at an additional expense of $_____

Contractor's Signature_____

A complete explanation of the **RED SEAL PLAN** appears on the reverse side of this proposal.
We will be glad to give you further details and answer your **RED SEAL** questions on request.
(over)

A Brief Explanation of the Red Seal Plan

The Red Seal Plan means many things to prospective home owners, but primarily it means freedom from worry and doubt as to whether or not they are going to be able to use their floor lamps, table lamps and various electrical appliances with comfort and convenience — WHERE THEY DESIRE TO USE THEM.

Red Seal home owners will not have an unsightly and dangerous web of extension cords weaving their way about the various rooms; nor will they be faced with the disagreeable prospect of re-wiring in a few years to bring their homes up to the standards that ALL homes are rapidly approaching. That is a point well worthy of careful consideration—the possibility of a desire to re-sell at a later date, at which time your home will have to compete with others that are newer. If it isn't modern according to the standards of that time, it will be difficult to sell.

For the small additional sum shown on the face of this bid, you can assure yourself of a home electrically convenient in which to live and a home electrically modern to offer for sale should occasion arise.

All this is assured by the careful inspections made by the California Electrical Bureau, and is certified to by a RED SEAL OWNER'S CERTIFICATE issued to you. All you need do is specify

"A RED SEAL HOME"

Where the going is hard, the specifications iron clad, and the architect or general contractor knows no other language but PRICE, the electrical contractor may have felt, "Oh, well, the deck is stacked against me," and let it go at that.

Just to circumvent that all-gone feeling the California Electrical Bureau devised the "Alternate Bid" form, reproduced here. Those who have used it report that in a number of cases it has aroused curiosity as to just what the Red Seal Plan might be from those who had never heard of such a thing. Sometimes this curiosity has been convertible into Red Seal, or at least into a closer approach to adequate wiring for the home.

Regardless of whether many must be sent before one **takes**, the sending of the alternate bid costs nothing and gives Opportunity a chance to knock. Those with keen ears are listening for opportunity when it means something to their comfort or profit. The Red Seal speaks both languages and has a persuative tongue if given its chance. The alternate bid may do it where ordinary means fail. It should be used on every house-wiring job.

Builder Uses Red Seal Home for Demonstration

Well Insulated Walls of Home Insure Success of Electric Heating Installation in Marysville Home

ANOTHER case in which a builder recognized the value of adequate wiring for a home which he intended to use personally is that of the first Red Seal home in Marysville, Calif. The house is a 6-room, stucco building whose total cost was approximately $10,000.

Not only is the builder, Mr. Triplett, of Hurlbert & Triplett, builders of Marysville, going to live in the house, but he intends to use it for display purposes for a year. The home was wired by the George Johnson's Electric House, Electragists of Yuba City.

Marysville's first Red Seal home is complete electrically, even to a built-in radio. It contains 20 kw. of air heating, 14 kw. in a range and water heater installation, and a Copeland electric refrigerator built in, bringing the total load to 34 kw.

Electric Heating Throughout

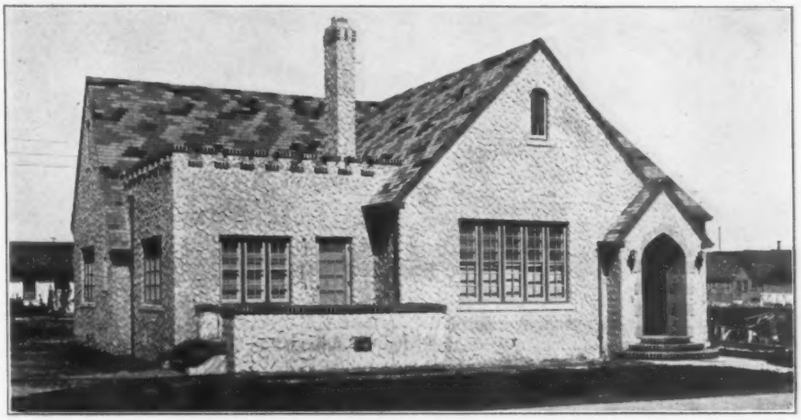
The electric heating is accomplished by means of eight flush type heaters controlled at the switchboard and three heaters having flush switch control.

Another feature of the home is that pilot lights are installed to indicate whether or not closet lights are burning. All the convenience outlets in the home are of the duplex type and are so placed that the plates are covered by drapes and are thus out of view.

Prior to his occupancy of the home Mr. Triplett opened the home for inspection as an electrically equipped home with all appliances on display. The home was the center of attraction for a number of days. It was advertised extensively in the local papers and visitors were invited to view it.

High Grade Wiring Job

An unusually high-grade wiring job was done on Marysville's Red Seal home. The entire wiring was carried in flexible metallic conduit through the 12-in. thick walls. The house was built



Marysville, Calif. was fortunate in that its first Red Seal Home was one erected by a builder for his own use and demonstration. The electrical installation is in flexible conduit and is particularly complete.

with an outer wall of 4-in. thickness, an inner wall of the same thickness and a 4-in. air space between them. This complete insulation from outside weather conditions results no doubt in material saving in energy cost for heating the home in winter as well as maintaining an even, cool temperature in the home during the hot days of the summer.

Figures on the operating cost of this home are not yet available but it is reasonable to expect that with good heat insulation provided by the walls of the house the energy cost to maintain a comfortable temperature throughout the cold winter months will be materially decreased.

This factor alone is one which may have considerable influence on the future use of electric heating in the home even as the matter of proper insulation of the oven of an electric range has determined to a large extent the feasibility of electricity for cooking.

City Pioneer with Gas Lighting Installs First Electroliers

SAN LUIS OBISPO, located on the Coast highway once known as El Camino Real, is one of the oldest cities in California. It has long been the halfway point between southern California cities and cities of the San Francisco Bay region of California.

As a progressive little city located on the highroad of travel, San Luis Obispo was one of the pioneer cities in California to adopt the use of gas for street lighting. Until recently when a new electrolier system was installed in Mount Pleasanton Square, a restricted subdivision, all of the street lighting in the city had remained gas.

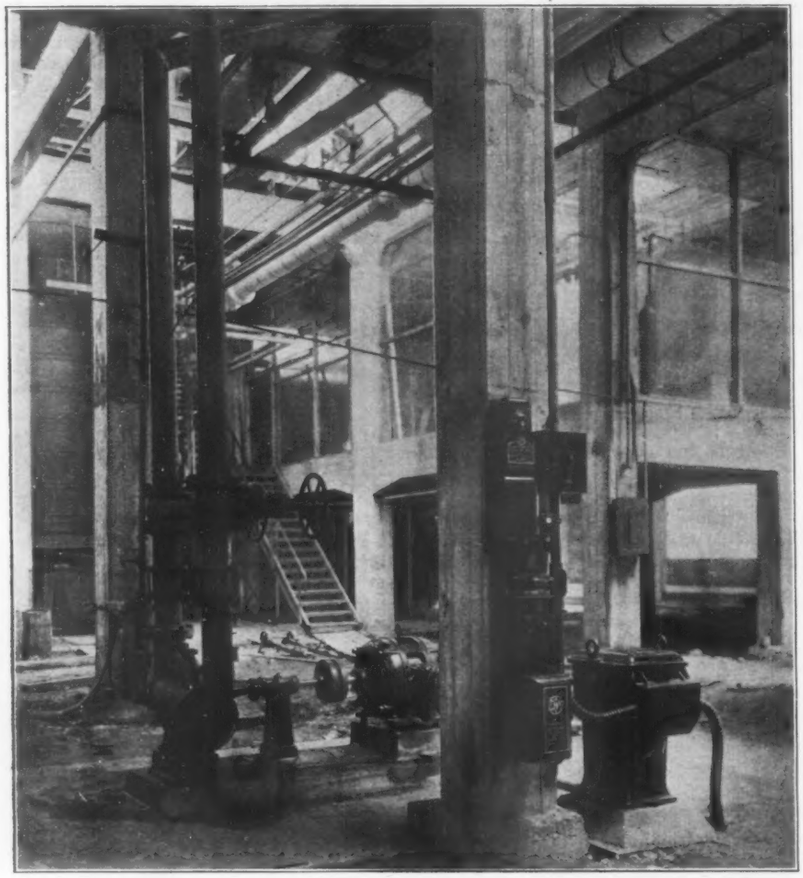
Not only was this installation the first electric street-lighting system installed in the city but in San Luis Obispo County as well. The installation was made by the Valley Electric Company of San Luis Obispo for Fred Schaffer, subdivision contractor of Santa Maria, under whose direction the subdivision was being put on the market.

Type of electroliers which are the first to replace gas lighting in San Luis Obispo. A Red Seal home in the background.

The street-lighting system was installed with Solux Westinghouse units mounted on concrete poles; a photograph reproduced on this page shows the type of electrolier used.

It is interesting to note that the photograph of the electrolier shown here was taken in front of the home of G. A. Rose, an all-electric Red Seal home located in this tract. Mr. Rose's home is equipped with a range, water heater and air heaters. In this case the installation was made by Cline's Electric Shop of San Luis Obispo, Electragists who are making great headway in the installation of Red Seal homes in that district.

Compact Controller Installation



A well planned and neatly executed installation of motors and compensators is that shown here. It is the 20-hp., 1,200-r.p.m. motor connected to the pump which delivers water to the vats for fermentation, commonly called the beer pump, at the Mason By-Products Company plant. The installation includes an oil-immersed automatic compensator with an overload protection panel which gives instantaneous action on severe loads or short circuits. An inverse time element is provided in case of light overloads. A 5-hp. motor starting switch may also be seen in the installation.

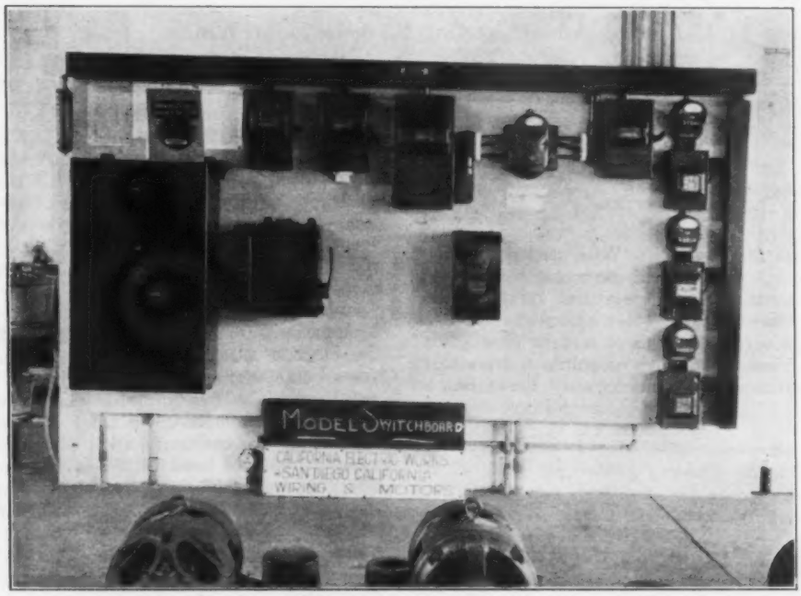
Question Box

Through the columns of Electrical West such questions on electrical construction and other subjects as are of general interest will be answered here. Inquiries should be sent to the Editor, Electrical West, 883 Mission Street, San Francisco.

Q. What is meant by "plugging" a motor?—L.A.W.

A. A method of "braking" a motor, to bring it to a rapid stop, by reversing the armature leads while it is still running. It imposes a very severe strain upon the motor and should be used only on equipment designed for this purpose. The controllers are provided with extra resistance to limit the current.

Shop Board Used for Motor Demonstrations



A two-in-one proposition, wherein the switchboard serving the motor needs of the contractor's own shop is made in such a way as to be available for demonstrations of motors on the floor and at the same time show the class of installation done by him, is the board of the California Electric Works of San Diego, Calif.

This company demonstrates motors on the floor of its shop. Portable cords are used for connecting the motors from two separate types of starter; one of the manual type, the other an automatic starter. The board serving the contractor's own shop is used as a display board in selling installations as well as for his own purposes.

By use of this board the salesmen are able actually to start any 220-volt motor on the floor, either of single or 3 phase.

A hinged trough above the board shown in the accompanying illustration is used to show the customer the reason for a quality installation.

Underwriters' Report Tells of Electrical Activities

Reviewing the activities of the National Board of Fire Underwriters for the year 1926, that portion of the report dealing with the electrical department contains much of interest to the electrical contractor and municipal inspector.

The report begins with a review of the work of the year which has called for enlarged personnel and greater facilities in all sections of the country. It goes on to state that steps are being taken to maintain intimate relations between the engineers at the several testing stations with a view to keeping rulings uniform and listings consistent. Among improvements named have been additions and improvements to the San Francisco testing station.

A brief note is given of the work of the electrical committee, National Fire Protection Association, with a number of manufacturers of non-metallic sheathed cable. The entire time of one engineer has been devoted to this work during the year, the report states.

Study was also made of circuit breakers especially designed for service entrance and branch circuit protection. The drafting of specifications for a newly developed type of small panel board which is intended as a substitute for a fuse cutout base in a cutout box was accomplished also. An exhaustive study of armored cable was made. Another year, it is estimated, will be required to complete this investigation.

The electrical features of devices not primarily electrical but employing electrical motors for power, such as oil burners, domestic refrigerators and motor-driven portable and stationary tools were also studied. Slight revisions in the standards of fuses, knife switches, cutout boxes, panel boards, flexible metallic conduits, have resulted from the work of the industry conferences during the year.

Increased interest in the work of the laboratories is reported and co-operation with electrical associations, inspectors' associations, and the American Engineering Standards Committee are noted in the report.

Details of tests made on electric materials are enumerated in the second part of the report and give an idea of the thoroughness of such investigations as undertaken by the laboratories.

Code and Safety Orders

Questions and Answers

Arrangements have been made with Claude W. Mitchell, electrical engineer of the Board of Fire Underwriters of the Pacific, to answer through the columns of Electrical West such questions on the National Electrical Code as are of general interest.

Similar arrangements have been made with George E. Kimball, electrical engineer of the Industrial Accident Commission of the State of California, to answer questions on the Electrical Safety Orders issued by the Commission.

While it is the object of this department to assist in a better understanding of the Code and the Safety Orders, replies given are not to be considered as official interpretations applying in all instances, as some of the rules permit of varying interpretations under different conditions. The questioner should be guided by the inspection department having jurisdiction.

Q. Assume an installation in which a wire serving as a grounding conductor is connected at one end to the neutral conductor of the service, and at its other end by means of an approved ground clamp to a DRY water pipe. This dry pipe is attached to a LIVE water pipe by means of a blind tee or a saddle clamp. Does use of dry pipe in this manner comply with National Electrical Code requirements?

A.—N. E. Code, Section 905-j, specifies sizes of either wire or pipe to serve as conductor for grounding conduit, armored cable, metal raceways and equipment. Section 905-h, in specifying sizes of grounding conductor for an alternating current system does not use the word "wire," but the sizes specified are **wire sizes,** and the opinion has been expressed by certain members of the electrical committee that it was the intention that wire should be used for grounding the neutral, while either wire or pipe might serve for grounding conduit, etc.

Therefore it appears that the assumed installation does not comply with the intent of the 1925 National Electric Code.

Just what the attitude toward this method of grounding will be in the 1927 edition of the Code it is impossible, of course, to state at this time. Two rules have been proposed, one of which would make it clear that pipe may not be used as a grounding conductor, while the other states very plainly that pipe may be used for this purpose. The proposed rules are about as follows:

1. The grounding conductor for circuits shall be of copper; for equipment, metal raceways and the like, it shall be of copper, iron conduit or iron pipe.

2. The grounding conductor for circuits, equipment, metal raceways and the like shall be of copper or other metal which does not corrode excessively. Where enameled conduit is utilized for this purpose, threaded joints and threaded fittings, properly cleaned and made up tight, shall be used.

Electric Heating Applications in Metal Industries

Further Consideration of Uses and Advantages of Electric Heat Which Contractors Can Utilize to Obtain Wiring Installations

By J. R. WILSON*, Quality Electric Works, Los Angeles

Electrical Estimating Series—XX

IN INDUSTRY the use of electric heat is only beginning to be recognized. Its advantages in control and in cleanliness and availability, as discussed in the article of this series published here last month, are as yet unknown to a great many potential users of this form of heat. It will be well for the electrical contractor to familiarize himself with these facts about electric heat in order that he may handle intelligently any situation he is called upon to take care of in electrical heating installation, if not actually to go out and sell industrial electrical heating himself and make his establishment one recognized as capable of handling that sort of job.

In this article will be discussed further applications of electric heat especially with reference to the metal industries, including the industries handling aluminum, brass, copper and steel.

Aluminum

Aluminum is being used very extensively in all branches of industry. In the airplane and automotive branches alone, hundreds of different parts are made of this metal. The extensive use of aluminum in these later-day industries has earned for it the name "modern metal". It is used in all cases where maximum lightness, combined with a high degree of strength, is the paramount requirement. These uses include crank cases, connecting rods, pistons, etc. When treated with electric heat the tensile strength of aluminum has been increased to 40,000 pounds. To anneal aluminum successfully the distribution of heat must be entirely uniform, and the temperature control must be very accurate.

In a fuel heated furnace these conditions cannot be maintained because of the fact that the degree of heat will vary in different parts of the furnace. The materials to be annealed therefore are subjected to varying degrees of heat, resulting in a high percentage of "rejects." As it is impossible to correct this condition, accurate temperature regulation is impossible. In annealing aluminum a ten degree limit must be maintained, which condition can be realized only with electric heat. In the electric furnace the heating is uniform throughout the operation, and automatic electric control gives regulation within any desired degree of accuracy.

Brass

Brass is very sensitive to thermal changes and very readily absorbs impurities. It is quite prone to oxidize; the zinc will boil off, and the metal very readily "burns" under a slight increase in temperature. With the above facts in mind, it will be seen that closely controlled temperature is absolutely essential in the annealing process. Where fuel is used certain products of combustion, such as sulphur, are always present in some degree. Brass has an affinity for these destructive elements and readily absorbs them, resulting in a product of inferior quality. All fuel fed furnaces depend upon air to complete combustion, and brass is subject to scaling in the presence of oxygen.

When fuel is used for annealing, repeated cleanings are required between the successive heating operations, resulting in increased labor charges and high production costs. All of these objectionable features are eliminated when the electric annealing furnace is employed.

A typical experience will serve to emphasize this claim: A brass manufacturer, who was using a fuel fed furnace, was compelled to employ one man whose sole duty it was to regulate the temperature, almost from minute to minute, guarding against excess heat or an inadequate anneal. Under the very best of conditions obtained by this human regulation the work turned out scaled, and was badly pitted. This resulted in a very high percentage of rejects—especially where the product was to be nickel-plated. This, of course, added a high factor to the production costs.

It is interesting to consider the different story told after his adoption of the electric furnace. He was able to anneal 13,500 small pieces in "charges" requiring only five minutes each for loading and unloading—a total of one hour of labor—compared with 14 hours where fuel was used. The saving on this one operation alone was $6.50, and the man had 13 hours to devote to other work. The annealing was uniform, there were very few rejections, pitting was eliminated, the cost of nickel-plating was reduced and the required time was decreased 75 per cent. After six months continuous operation this manufacturer reports that not one cent has been spent for furnace upkeep, and there is no indication of such necessity at any time in the immediate future.

Copper

In annealing copper, two difficulties are encountered—the metal must be made bright, and it must be made so soft as not to crystalize nor break. Unless it is shielded (in a fuel fired furnace), the products of combustion act upon the metal and cause it to become dull. This leads to the necessity of enclosing the pieces being treated in steel retorts. The life of these retorts is rarely for more than one year so the periodical replacement cost becomes one of the factors of production cost.

Electric heat produces bright copper at a comparatively small overall cost. The absence of deleterious fumes permits of direct exposure of the copper in the annealing furnace. There is no necessity for the use of retorts and there is no investment required for this item, nor is there for the constant replacement charge. The water seal electric furnace is now used universally for the bright annealing of copper wire. One of the largest manufacturers of this product now uses five of these furnaces, **and the connected load is 900 kw.** Quite a nice little wiring job—what?

The use of electric heat for annealing produces a degree of ductility that cannot be obtained with any other source of heat. Recently one wire manufacturer had an interesting experience along this line. All of his own product is electrically treated. To fill an emergency order, he purchased wire from an outside source, and then the fun began. Immediately upon receipt of the shipment, his customer com-

Scope of This Article

In this article no consideration will be given to electric heat as an air heating medium. Only manufacturing processes involving direct application of heat as a means of changing the composition, quality or structure of specified materials, will be given recognition. For purposes of clarity it seems best to consider each class of metal or material separately. A brief outline of the possibilities for application of electric heat to each class will be given merely to serve as a guide to such further study as may be desired.

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plained that the wire was brittle and liable to fracture. Upon conducting comparative tests, some surprising results were obtained. These were as follows:

	Fuel Heat	Electric Heat
Average elongation	30	46
Variation in hardness	40%	10%

Many motor manufacturers will accept now only copper wire which has been electrically annealed. This is a significant indication of the ever increasing demand for bright, dependably ductile copper wire.

Steel—"The Backbone of Industry"

A revolution has come about in the steel industry since the introduction into it of electric heat. Formerly the production of commercially useable steel was dependent upon expert skill, ripe judgment, constant watchfulness and costly attendance. Electric heat and refinements of automatic electric control have rendered the steel industry practically independent of the human element as applied to operation. This has resulted in a better, more even product and a decided decrease in the cost of production. The resulting economies have been reflected in the ability of the manufacturer to sell his product at a fair profit in a highly competitive market. Electric heat treatment of steel is being adopted universally and the superiority of the product is recognized, as shown by the ever increasing demand.

Annealing

Steel wire, sheet steel, castings and forgings are annealed to remove internal strains caused by working the metal into shape, to soften it for cutting, and refine the grain. To be successful the process is dependent upon uniform temperature within the furnace and positive control of the heat. Electricity provides these two essential requisites in a degree far superior to any other form of heat and is not dependent upon supervision based upon purely personal judgment.

The proper annealing cycle for steel, containing any percentage of carbon content, has been definitely determined by metallurgists in the laboratories. By analysis the steel is classified and the proper annealing cycle specified. The operation then becomes entirely automatic. The electric furnace is brought to the proper temperature (as predetermined), then allowed to cool with no danger of the work being spoiled. The uniform temperature treats every part of the metal alike and the process can be accurately duplicated as often as desired. Where silicon steel is being treated the charge can be transferred immediately to a cooling box, and the furnace recharged.

Case Hardening

The case hardening process consists of heating the steel in a bed of carbonaceous material to increase the hardness of its surface. When thus treated the surface will stand long wear while the core remains tough. Temperature control is all-important during this process because the metal must absorb a predetermined amount of carbon. The metal must be brought to the correct temperature and this exact heat maintained until the process is complete. By aid of a thermocouple pyrometer, inserted in the electric furnace, this exact temperature control is maintained with the smallest possible variation.

Melting

The basic operations in the steel industry are melting and refining. Improvements in methods of performing these operations constitute some of the outstanding developments of electric heat treatment of steel. Due to absence of all oxidizing and carbonizing action, electric heat meets the primary requirement of cleanliness. Due to accuracy of electric control any degree of heat can be reached and held in the electric furnace as long as desired. As all sulphur, phosphorus and other impurities can be burned away without affecting the final product the steel bath can be refined to a very high degree.

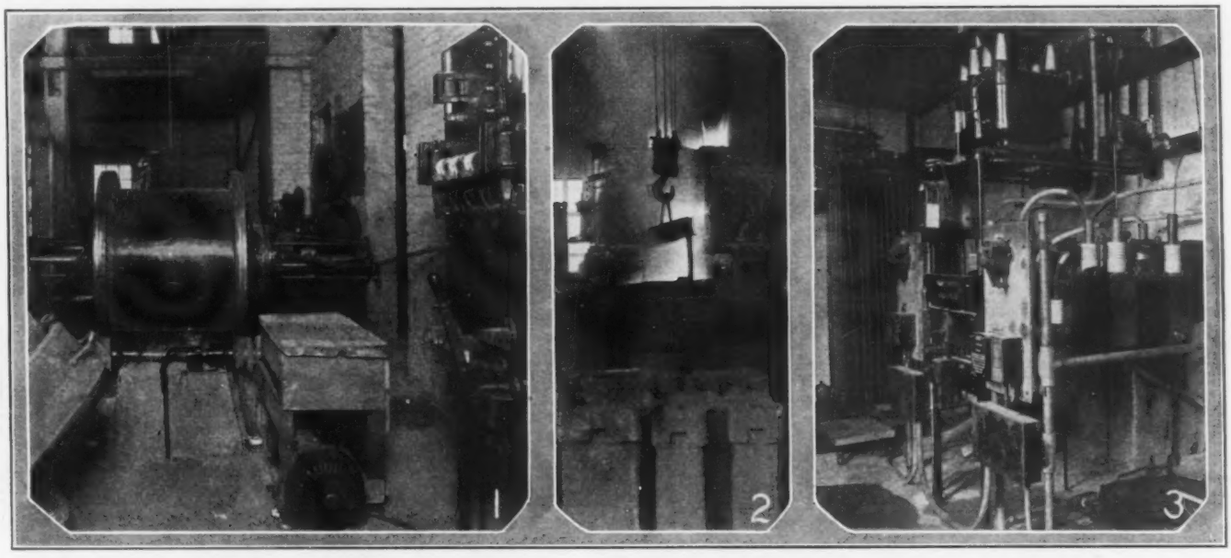
Several different kinds of steel can be made in the same furnace with uniform quality production assured at all times. It is now possible to make large quantities of crucible steel in the electric furnace with the cheapest grades of raw materials and with a high standard of output. The use of alloys is reduced 30 to 40 per cent representing an immense saving in quantity production.

Hardening and Tempering

New economies have been realized in hardening and tempering due to the use of electric heat. It is essential that the heating be absolutely accurate throughout to secure maximum physical properties in the steel. Absolute accuracy and uniform heat distribution, absence of flame temperature and oxidizing effect, all these are accountable for the increased adoption of electric furnaces where quality of product is essential. While the additional cost amounts to less than 1 per cent the value realized, due to improved product, is greatly increased.

Electric Welding

Arc welding, spot welding, and butt welding—both manual and automatic—are rapidly superceding all other methods of uniting iron and steel. With arc welding the metals are melted and welded into a homogeneous whole. No fear need be felt regarding the durability of joints properly made by this method. The same statement holds good on both spot and butt welds.



Electric heat applications in metal industries require heavy duty installations. Fig. 1, above, shows the electrical installation for a brass melting furnace in which the electrodes enter from opposite ends of the furnace. The switchboard for this installation is to be seen on the right of the picture. In the center picture (2) a steel melting furnace is seen pouring a charge of molten metal into a traveling ladle. Moulds ready to receive the metal are seen in the foreground. In the picture at the extreme right (3) may be seen the transformer and control apparatus installed in the Oregon Brass Works, Portland, Ore.

Better Merchandising

Selling the Greater Usefulness of the Waffle Iron

Like Any Other Appliance this Month's Special Will Only Become a Permanent Load Builder if Kept in Use in the Home

FEW electric appliances adapt themselves to such varied and interesting uses as do waffle irons. Once upon a time if a waffle iron made good waffles that was all that could be expected of the poor thing. Unfortunately, however, waffles do not happen to be an item of daily diet. Until the advent of the electric waffle iron, at least, a waffle was a thing of beauty and a joy for the Sunday morning breakfast alone. This hardly satisfied the demand. A waffle iron on the line once a week was hardly worth bothering about.

Then it was discovered by some inventive person, one of those people of genius such as he who first tried oysters and then added them to the list of things edible and delicious, that a waffle iron would do more than waffle. It would bake bread, make omelets, cook shortcake, do up corn fritters—and the list of its accomplishments can now be limited only by the imagination of the cook.

Forthwith the waffle iron came off the buffet, where it made a decorative place for itself only, and back to the breakfast, dinner and supper table, sometimes even to the kitchen sinkboard. It may be a little less polished these days, but it certainly is more enjoyed. It has become not only a thing of beauty but a joy **forever,** Sundays included.

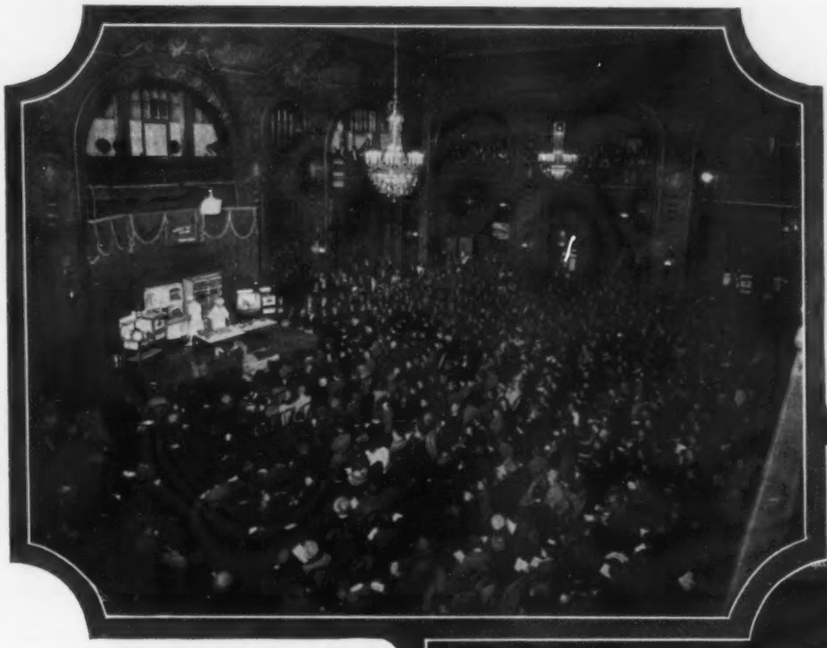
National advertising will feature waffle irons during February and part of March. Dealers and merchandisers everywhere are planning tie-ins with this general campaign. Sales plans, advertising helps, and even co-operative dealer and power company campaigns are being planned for almost every locality in the West.

But no waffle iron should be sold without its follow up. That follow up should consist of a little booklet of recipes for waffle-iron made dainties such as those published last year by the Valley Electrical Supply Company of Fresno, or by the Southern California Edison Company, Los Angeles, which is to be used in this year's dealer co-operative campaign. Manufacturers of waffle irons, almost without exception, are able to furnish such recipes in one form or another.

It is wonderful what a little orange sauce, a dash of whipped cream, or a mysterious dressing will do even the lowly doughnut when dressed up in such guise at a great confectioner's establishment. How much more wonderful may not the humble waffle become inspired by these methods and how much better an appliance will be the waffle iron, placed on the line morning, noon and night by the ingenious housewife!

HOT CAKE WAFFLE IRON
MAJESTIC
ELECTRIC APPLIANCE CO. INC
MAJESTIC
WAFFLE IRON
CAKES
MAJESTIC
Electric Heaters
Only MAJESTIC ELECTRIC MAKES both Hotcakes and Waffles HOTCAKES WAFFLES
Only MAJESTIC ELECTRIC MAKES both Hotcakes and Waffles HOTCAKES WAFFLES
Give her a MAJESTIC Hot Cake and WAFFLE IRON
Give her a MAJESTIC Hot Cake and WAFFLE IRON

Attractive waffle iron window set-up employing simple objects and dealer help material.



More than 2,500 women came each day to the first free cooking school held in Vancouver, B. C., last May. The upper picture shows the crowd on one of the biggest days of the school. Demonstrating electric cooking at the first annual cooking school (lower picture) under the auspices of the Vancouver Evening Sun, the British Columbia Electric Railway Company and the Canadian Westinghouse Company. Miss Agnes M. Read demonstrator, at left. Miss Ethel Gunn, assistant, at right.

Ten Thousand Women

came to learn about the advantages of electric cooking when the British Columbia Electric Railway Company began its campaign

Introducing the Range to Canadian Housewives

Entire Community Co-operates to Make First Cooking School in Vancouver an Unqualified Success from Every Angle

WITH complete success attending it every day, the first cooking school to be held in Vancouver, B. C., took place last May and it is expected will be repeated this year. It was under the joint auspices of the Vancouver Evening Sun, the British Columbia Electric Railway Company and the Canadian Westinghouse Company.

Altogether 10,500 women attended in six sessions, five in the afternoon and one in the evening. Inclement weather failed to hold back the crowds, which reached 2,500 on the largest day. Many women were turned away, unable to find room.

The school was held in the ballroom of the Hotel Vancouver, centrally located with an entrance on the principle shopping street of Vancouver. The demonstrator was Miss Agnes M. Read, the British Columbia Electric Railway Company's own domestic science expert. Miss Read operated on a specially constructed platform, visible from all parts of the hall. Special lighting arrangements were made around the platform and amplifiers were used to throw her voice to all parts of the auditorium. The table on which she operated was tilted to show mixing of food stuffs. Two Westinghouse automatic ranges were used while a Servel electric refrigerator was also on the platform.

What Each Contributed

The cooking school was organized on a three-part basis: The Vancouver Evening Sun supplied the hall, provided the loud speakers and did a large amount of preliminary publicity work. It not only played up the forthcoming event on its front pages but it distributed invitations to non-subscribers. The Canadian Westinghouse company contributed a Westinghouse automatic range, given away as an attendance prize and a certain amount of newspaper advertising. The British Columbia Electric Railway Company contributed a Thor electric ironer as a baking contest prize, supplied the demonstrator and contributed newspaper advertising. Other baking contest prizes were contributed by electrical appliance manufacturers.

As an attendance inducement, there was offered a new Westinghouse automatic range, available to everyone who registered at any of the sessions. On entering, each lady was given a card on which to write her name and address. This card was deposited in a ballot box, 100 names being drawn each evening. From the names thus selected the final winner was chosen at the close of the

school. This list of names gave the central station company a mailing list which was used in the selling campaign that followed. A large postcard was mailed to each of these prospects and a broadside was then mailed to 25,000 householders throughout the city.

Success This Year Assured

It needed no drawing, however, to attract women to the school. This was the first event of its kind held in Vancouver and its success assures those who organized it that this year's school will need no further introduction.

Prior to the opening of the school, the Vancouver Gyro Club held its weekly luncheon in the ball room, the chief features of which were a flapjack flipping competition, judged by Chef Joe Cherrier of the Hotel Vancouver, and a flapjack eating competition.

After the school had been officially declared open by Acting Mayor Gibbens, girls from the domestic science classes of the city schools, filling the hall, listened to the first lectures on cooking. At this session, adults were not expected to attend. On the following four afternoons and on one evening adults attended in increasing numbers, the record for attendance being:

Monday	1,500
Tuesday	1,500
Wednesday	2,000
Thursday	2,300
Thursday evening	700
Friday	2,500
Total	10,500

At the Thursday evening session a special lecture was given for business girls who cook their own meals. An oven cooked dinner, biscuits, "rocks" and other quickly prepared dishes were described.

Question Box Feature

A feature of the school was the question box, maintained in the hall. The questions asked by those attending the sessions were answered by Miss Read in the columns of the Vancouver Sun. Pads and pencils were provided at each seat for taking notes and it was noticed that points made which would have been passed over by men would often set hundreds of pencils to work.

During the afternoon each day, an interval of five to ten minutes for rest was given the demonstrator and this opportunity used for talks on electric cooking sales by representatives of the central station or manufacturing company.

The demonstrator continued her work after the school by giving talks over the radio. During the school, an exhibit of electric ranges and electric refrigerators was maintained at the entrance to the hall and sales representatives were on hand to answer questions and give demonstrations.

Baking Contest Held

In conjunction with the school, a number of baking contests were held, the judge being Chef Cherrier of the Hotel Vancouver. The classes comprised:

Cake Division: The first prize a Thor electric ironer offered by the British Columbia Electric Railway Company, and eleven other prizes.

Pie Division: First prize a Royal Electric vacuum cleaner offered by the Continental Electric Company, and eleven other prizes.

Health Bread Division: First prize a Thor electric washing machine, offered by the Household Utilities Corporation, and eleven other prizes.

A Special Cooking Contest for school children in grades 7 and 8 and the high schools; prizes totaling $95 being given by the Vancouver Sun.

These competitions were not open to any professional chef or cook and the ingredients were to be those advertised in the Vancouver Sun during the contest.

The prizes offered in these contests aggregated in value $750.

Altogether 681 entries were received in the several contests, divided as follows:

Cake	184
Pie	172
Health bread	240
School children	85

After the judging, cakes, pies, bread and other entries were sent to the Daughters of the Empire and sold, proceeds being devoted to charity.

Following the school, an energetic selling campaign on electric ranges was commenced by the British Columbia Electric Railway Company and the Canadian Westinghouse Company.

Competition, but with Co-operation

Another Public Utility Demonstrates that it May Merchandise Without Harming the Individual Dealer

By CHARLES N. TUNNELL, Austin, Texas

"Beat the competitor" was a policy with a good many old fashioned companies, but it is a policy that is passé today. Nowhere is this better demonstrated than with the Southwestern Public Service Company, whose headquarters are in Roswell, N. M. This company finds it more profitable to all concerned to co-operate with instead of trying to cut the throats of its competitors. Like any utility this company is in a position as the only electrical service plant in the territory to make keen competition for all electrical supply retailers. Yet though it does sell electrical supplies and appliances, it does so on a co-operative basis.

It is the common complaint of electrical retailers that they are made to feel the pressure of a retail department of a service plant when the retail department sells at reduced rates, making only operating expenses and depending upon receipts from service charges for profit. Yet such has never been the case with electrical supply dealers of Roswell and the three other towns of southeastern New Mexico served by the Southwestern Public Service Company. Although this utility is constantly on the alert to push its appliance sales, it does so on the same basis as that of other dealers. Only standard, well recognized articles are handled.

Dealer and Power Company

in a New Mexico community co-operated to put on a three-day demonstration event which resulted in sales and good will for the entire industry.

A Matter of Education

More appliance sales are only a matter of educating the public to the use of nothing but electrical equipment, according to F. A. Herring, general manager of the company. He finds that by co-operating with other retailers and with wiring contractors he is able to get his educational program over to the public in a much more forcible manner than if he attempted to do it alone. This utility does not operate a wiring section, neither does it push fixture sales especially. It co-operates with its competitors to the extent that it leaves this field untouched for them. Of course it carries a light stock of fixtures merely to make its stock complete and to accommodate customers who call for such articles, but it does not push this line of merchandise as it does electric ranges, sewing machines and all other types of electrical appliances.

One sales plan which proved successful for this company and local dealers in the territory was a demonstration event staged in the sales room of the company. This demonstration covered a period of three days and was especially designed to advertise electric ranges; however other electrical equipment also came in for its share of the attention. Special advertising was featured for several weeks before the open-

Windows of the Southwestern Public Service Company of Roswell, New Mexico, attract sales and set an example of good window treatment to other stores in the community.

ing of the demonstration. The advertising took the form of local newspaper advertising, hand-bills, interviews, sales letters and placards placed in the windows of other dealers and electrical contractors of the town.

All Electrical Outlets Co-operate

Naturally the utility had a list of all the customers of the plant, but there were a number of prospects located in adjacent territory that were not known to it. It was through contractors and fixture dealers that the power company was able to reach a large portion of these prospects. Many of these were the owners of old homes which could be brought up to modern standards merely by the installation of house wiring and equipment with modern fixtures and electrical appliances. By co-operating with other electrical dealers no prospect was overlooked. A sales letter or other form of invitation to attend the demonstration of electrical cooking was sent to each.

During the demonstration event a cooking demonstrator gave daily lectures as well as demonstrations of what could be accomplished with an electric range. In order to emphasize the economy of using this type of equipment, figures were quoted from the books of the company showing that average monthly bills of a number of range customers were not high. Each interested prospect was then given an estimate of how much the monthly service charge would be if he decided to use a full line of electrical equipment.

Contractors Get Wiring Orders

The contractors of the territory were present during this demonstration to figure with interested prospects on wiring contracts. Many of those attending owned old and some new houses which had never been wired, while others called for re-wiring contracts for people who had seen by the demonstration that their old electrical installation could be improved and made more economical and convenient. Fixture dealers were also invited to attend the demonstrations and to offer suggestions as to the proper number of fixtures and to estimate on the cost of refixturing.

In this way prospects were supplied with complete figures on every item of electrical service and equipment from the service charge to the appliance cost and installation charge. The event was looked upon more generally as a school than as a sales stunt. By having all electrical dealers and contractors participate, visitors were shown that each member of the electrical industry was interested in the individual needs of the public and was not merely trying to outsell some competitor.

Every prospect was instructed that he was at liberty to get figures from any wiring contractor or from all of them; likewise he could select his furnishings and fixtures at any place he desired. The same held true in regard to the ranges and appliances. Naturally, as the power company had gone to the expense of promoting the event special stress was laid upon the makes of ranges and other appliances handled by it.

Results of the Campaign

Each day of this three-day demonstration an electric iron was given to one of the visitors as a premium. All employees of the power company and all those interested in any electrical business in the city took it upon themselves personally to see that a large number of prospects attended the daily demonstrations.

The three-day demonstration moved more than forty electric ranges for the Southwestern Public Service Company. A number of these went into homes which had not been wired previously but which, through the co-operation of wiring and fixture contractors, were induced to modernize by installing a system of wiring and fixtures and equipping the home with modern electrical appliances.

Other sales, including sewing machines, vacuum cleaners, as well as smaller articles such as toasters, percolators and waffle irons, were made as a direct result of this campaign. Each electrical dealer in the territory profited by the plan, both in actual sales for himself and in education of the public to the use of electrical equipment. Moreover, it had to be carried on without the damaging effects of direct competition among the various dealers of the trade territory.

Linked with this selling plan was a system of appealing window displays that were used by the utility company at all seasons of the year. Its windows are attractive reminders to the passing public that here are certain articles needed for the home. This fact along with the prospect tips received from contractors assists the Southwestern Public Service Company to do a business which means a profit to the trade as a whole.

Specifications for Residence Lighting Equipment.—Specifications which may be employed by central station members of the Association of Edison Illuminating Companies in selecting residence lighting equipment for sale to the public are now available in tentative form. These specifications have been prepared by a committee of the association which has enjoyed the assistance of a committee of the Illuminating Engineering Society in formulating the requirements for lighting characteristics. The specifications have been issued "for trial and criticism." They call for rating of residence lighting equipment with regard to lighting qualities, construction and appearance, respectively. Under the first of these heads there are included means for rating equipments with respect to light output and glare. Copies of these specifications may be had from Electrical Testing Laboratories, 80th Street and East End Avenue, New York City.

News of the Industry

Tax on Publicly Owned Utilities Proposed in California

A proposed constitutional amendment recently was introduced in the California Assembly seeking to secure the taxation of publicly owned and operated public utilities. Under the terms of the proposed measure all property, works, plants and equipment operated, managed or controlled by any city, city and county or similar political subdivision or other public agency to supply light, power, heat, transportation, telephone and telegraph service, shall be assessed and taxed in the same manner and to the same extent as like property held or used for like purposes by private corporations.

The measure has the backing of the agricultural legislative council of the Farm Bureau, the State Grange and similar organizations, and is designed to lighten the burden of taxation in the rural districts that is increased by the exemption allowed municipally owned public utilities, according to the proponents of the proposed amendment.

Rehearing in Water Rights Case Denied Edison Company

By a vote of 4 to 3 the Southern California Edison Company has been denied a rehearing in the so-called Herminghaus case.

Through the filing of a petition on Jan. 13 by the Southern California Edison Company the California supreme court had been asked to rehear the arguments in the case brought by the heirs of the Herminghaus estate against that company. The supreme court recently upheld the decision of the superior court that the power company may not impound the waters of the San Joaquin River and its tributaries to such an extent as to prevent the annual overflow of the river and the consequent inundation of the Herminghaus lands. (Electrical West, Jan. 1, p. 47.) Because of the importance of the decision as affecting hydroelectric development in the state the case should be given further consideration, in the belief of the power company's attorneys. The principal ground on which petition for rehearing was based was the fact that Associate Justice Jeremiah Sullivan did not hear the original arguments last July, not having taken his seat until later, although he concurred in the decision of the majority of the court, and that he was constitutionally disqualified to concur in the opinion. Associate Justice Shenk filed a dissenting opinion. It was asked that the court rehear the case with a full bench.

Three minor contentions were made, namely, that the Herminghaus heirs knew of the Huntington Lake project of the Edison company as far back as 1912 but took no action in the matter; that the Edison company as a riparian owner has rights to its proper share of the San Joaquin River waters; and that the opinion rendered failed to cite a single case between riparian owners but does cite cases between riparian owners and appropriators, whereas both parties to the present suit are riparian owners.

The federal government, through the United States attorney general, had joined, as a friend of the court, with the Edison company in seeking the rehearing, citing several points in the decision in which the government is vitally interested.

Bungalow-Type Substation Being Built at Manhattan Beach

Construction work on a new bungalow-type of substation building in the Manhattan Beach section of the Redondo Beach territory has been started by the Southern California Edison Company, Los Angeles. This substation will be constructed at the corner of Dianthus Street and Duncan Avenue, Manhattan Beach, and is expected to cost approximately $48,000.

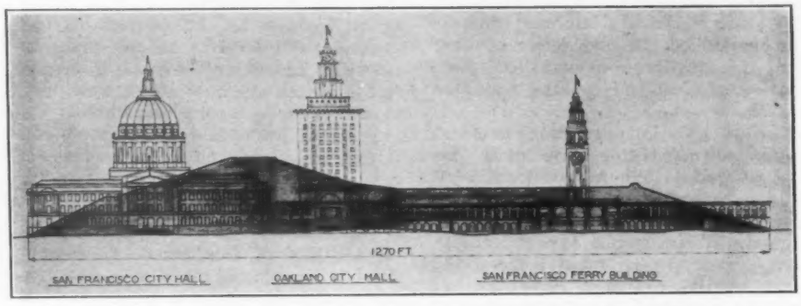
In the construction of substations in residential territory the Edison company has adopted the policy of building what is known as a bungalow-type structure, which is in effect a typical California bungalow, with the electrical equipment so concealed as to make it impossible to guess its identity from the street. All lines leading in or away from stations of this type are placed underground, and all outdoor equipment is placed in the back of the building.

The installation now under construction will add approximately 2,000 hp. of energy to the Manhattan Beach territory.

Work on Big Dam Completed by Great Western Company

The work of enlarging the Big Meadows dam of the Great Western Power Company of California has been completed at a cost of $2,000,000, and as a result the capacity of Lake Almanor has been increased from 300,000 acre-ft. to 1,300,000 acre-ft. In this reservoir will be stored not only the usual winter runoff from the company's 500-sq.mi. watershed in Plumas County for the generation of power and for irrigation during the summer months, but also it is planned to retain the surplus runoff of abnormally wet winters for use during a period of succeeding dry years.

The original Big Meadows dam, of earth-fill construction, was built in 1914 and flooded 25 sq.mi. of mountain meadow land at el. 4,455 ft., creating a storage reservoir of 300,000-acre-ft. capacity. This structure has been increased in height from 90 ft. to 135 ft. above stream bed, its thickness extended from 470 ft. to 1,270 ft., and its length increased from 600 ft. to 1,200 ft. The new elevation will be 4,500 ft., and water impounded will cover 47 sq.mi. of land. An important feature of the work is a spillway of 40,000-sec.-ft. capacity. In addition, a reinforced concrete tunnel 1,334 ft. in length beneath the dam permits the discharge of water from the lake into the Feather River below.



The Great Western Power Company adopted this means to show the size of Big Meadows Dam.

With the immense storage capacity of Lake Almanor, the company's hydroelectric project on the North Fork of the Feather River has a potential development of 1,000,000 hp. Two plants, Caribou and Las Plumas, are now in operation with a combined capacity of 175,000 hp., and eventually eight more plants will be constructed at strategic points, using the stored water of Lake Almanor over and over again at various heads.

Power Company Begins Second Plant on Rogue River

Work has been started by the California Oregon Power Company, a subsidiary of Standard Gas & Electric Company, on Prospect No. 2, a hydroelectric power plant on the North Fork of the Rogue River in Oregon, according to announcement of H. M. Byllesby & Company. The new plant, which is to have an initial capacity of 22,000 hp. and an ultimate capacity of 66,000 hp., is to be built under the supervision of the Byllesby Engineering & Management Corporation at an estimated cost of $3,250,000.

A diversion dam will be built about two miles above the powerhouse site. There will be an open canal 6,600 ft. long, and a 3,100-ft. wood-stave pipe line and a 980-ft. penstock will carry the water from the forebay to the power house. The plant will operate under a head of approximately 600 ft. and is planned for operation at a 97 per cent annual load factor. A step-up substation will be built at the power house, and a high-tension transmission line will be extended 36 miles to connect with the California Oregon Power Company's system at Medford, Ore. It is expected that the initial installation will be completed by Oct. 1, 1927.

Contract for a 24,500-hp. vertical reaction turbine for the first unit has been let to the Pelton Water Wheel Company.

Prospect No. 2 will be built above the existing Prospect No. 1, which also is on the Rogue River and has a capacity of about 6,300 hp.

Interior Department Proposes Construction Program

A tentative ten-year construction program for federal reclamation with total estimated expenditures amounting to $97,514,000 that will result in the completion of all existing government projects has been proposed by the Interior Department.

The program contemplates construction work on twenty-two unfinished projects in seventeen Western states with annual expenditures averaging between $8,446,000 and $10,826,000, a sum exceeding the probable average annual income of the Reclamation Fund by about $1,000,000. If adopted, the program will preclude the undertaking of any new projects by the government during this period.

Of the amount estimated for expenditures, a total of $1,164,000 is allotted to the Newlands project in Nevada for Truckee storage, canal construction, a power system and Carson division distributing system, of which $64,000 is to be expended in 1928, $50,000 in 1929, $50,000 in 1930, $500,000 in 1934, $500,000 in 1935. This project under the program will be completed in 1935.

To the Minidoka, Idaho project is allotted a total of $8,423,000 to complete the American Falls reservoir, American Falls power development, Minidoka power development, South Side pumping division drainage and North Side pumping unit. This proposed expenditure is divided as follows: $1,583,000 in 1928, $1,000,000 in 1930, $2,671,000 in 1931, $1,000,000 in 1932, $1,250,000 in 1933, and $919,000 in 1934. This project under the program will be completed in 1934.

Cake Replica of Power Building Features Christmas Party

A fruit-cake replica of the San Joaquin Power Building, electrically illuminated in the same way as the original, was the feature of the annual Christmas party given by the San Joaquin Light & Power Corporation, Fresno, Calif., to its employees and their families. The big cake was presented to A. G. Wishon, president of the company, by the employees of the Valley Electrical Supply Company.

The cake stood about five feet high and was floodlighted exactly as is the real building, miniature lighting units arranged on the same scale as the lighting of the building having been employed. More than 150 lb. of cake were used, some of the ingredients being 50 lb. of raisins and currants, 15 lb. of citron, 5 lb. of almonds and 100 eggs. The dough was baked in specially designed and constructed pans, and twenty-one different cakes, varying in weight from 5 to 8 lb., were required to complete the building, each being carefully fitted into the replica. Window displays along the street line were shown in transparencies photographed

San Joaquin Power Building.

from the original windows, and details of architecture were reproduced in frosting by John Thomsen, chef of the Hotel Fresno. The cake was designed and built by Carl F. Wolf, illuminating engineer, Mrs. Mabel E. Tripp, domestic science demonstrator, and J. U. Berry, display manager, respectively, of the Valley Electrical Supply Company. Presentation of the edifice to Mr. Wishon was made by H. H. Courtright, president of the Valley company.

More than 1,000 employees of the San Joaquin Light & Power Corporation, the Midland Counties Public Service Corporation and the Valley

Fruit-cake replica of Power Building.

Electrical Supply Company, and their families attended the party. Three Christmas trees, motion pictures, and distribution of toys and candy by Santa Claus pleased the children while the grown-ups enjoyed dancing.

Arrangements for the party were in the hands of a committee headed by A. S. Walthall, president of the San Joaquin Power Club, and Mrs. Irene Griffin, social vice-president of that organization.

Number of Power Developments Planned in Mexico

Additional electric energy is urgently needed in Mexico, and the entire situation is being investigated by a government commission, according to U. S. Commerce Reports. A number of power developments, each of which includes the irrigation of a large area, are planned.

The first project to be carried out probably will be near the headwaters of the Lerma River, in the northeast corner of the State of Michoacan. The original concession for an irrigation project was given to the firm of Siemens-Mexico, S. A., but it has been decided to construct a hydroelectric plant as well, and this will be done by the Cia. de Fuerza del Suroeste de Mexico, S. A., a subsidiary of the Mexican Light & Power Company, Ltd. It is expected that the initial installation will comprise two large units of 30,000 hp. and this can be increased when needed by another unit of the same size. A high-tension transmission line, about 40 miles long, will connect the mining camp of El Oro, now the terminus of a power line from Mexico City, to the new plant. The hydroelectric project alone will cost at least 15,000,000 pesos. The amount to be spent by the government on the irrigation system will amount to several million pesos.

The attractive dining room and service counter, respectively, of the cafeteria recently opened in the Los Angeles Gas & Electric Corporation Building for that company's employees.

Cafeteria Serves Noon Meal to Power Company Employees

For the benefit of employees of the Los Angeles Gas & Electric Corporation a cafeteria has been opened in the main office building on Flower Street. The operation of the cafeteria is in the hands of an outside party, but rent, gas, electricity and all equipment are furnished free by the corporation to the operator, who supplies the food and necessary help. As the company does not wish to realize any profit from the enterprise, the arrangement as worked out enables the operator to serve the employees good food at very moderate prices. The cafeteria is operated for five days a week at noontime only.

The kitchen equipment is of the most modern type and includes a hotel range, electric refrigerator, vegetable paring machine, dishwasher and mixing machine. All pastry tables, cupboards, dish closets, dining tables and chairs were built in the company's shops.

A color scheme of blue and gray, cheerful draperies and potted palms make the cafeteria attractive.

Lake Chelan Power House Plans Announced by Company

Plans for the power house on the project being built by the Chelan Electric Company for The Washington Water Power Company have been announced. The building will be of the Italian Renaissance period, combining maximum utility with architectural beauty, and will be constructed at this time to house two units and an erecting bay. The first unit is expected to be in operation next summer and a second unit in 1928, contracts having now been let for equipment for both units. These units will have a rating of 32,000 hp. each. The building is designed to be extended to the south at a later date when the final two units are installed. The third and fourth units will give the station a total installed capacity of about 128,000 hp.

At the opening of the year concrete work had been started at the power station and about a third of the concrete had been poured at the dam. About 1,300 ft. of the 11,701 ft. of tunnel had been concrete-lined.

Tuolumne River Project Planned by Irrigation District

The Turlock Irrigation District has applied to the Federal Power Commission for a preliminary permit for a power project on the Tuolumne River and its tributaries, in Tuolumne and Mariposa Counties, near Groveland, Calif.

Under the applicant's plans water will be diverted from the Middle and South Forks of the Tuolumne into the Groveland reservoir, to be located in Big Creek, where a rock-fill dam 240 ft. in height will impound 80,000 acre-ft. of water. A power house designed to develop 40,500 hp. of electric energy will be built on Tuolumne River, through which the water will be carried into a regulating reservoir of 20,000-acre-ft. capacity into the river, from which it again will be diverted into a forebay where, with water from Moccasin Creek, it will be taken through another power house, called the Jacksonville plant, further down the river and emptied into the existing Don Pedro reservoir, belonging to the Turlock Irrigation District. At the Jacksonville plant 12,000 hp. will be developed. The impounded water will be used for both irrigation and power. The power to be developed will be used in meeting the district's irrigation-pumping requirements, any surplus to be sold for public-utility use.

National Electric Manufacturers Association to Move.—The National Electric Manufacturers Association will move from its present quarters at 30 East Forty-second Street, New York City, to the Graybar Building, about the time that building is completed April 1. Among the activities of the association is its program for promoting the collection and dissemination of statistics in the electrical industry. The work of the association's committee on uniform cost accounting will be extended further in 1927, and there will be close co-operation with the various departments of the United States government in lines where the association can render service. Gerard Swope, president of the General Electric Company, is president of this association.

Los Angeles Steam Plant Work Stopped by Injuction

A temporary order was issued Jan. 15 by the Superior Court of California restraining the Los Angeles Bureau of Power and Light from proceeding with work on its proposed steam plant at San Pedro, the harbor of Los Angeles. The order was issued in the case brought by the Southern California Edison Company, as a taxpayer, against the Water and Power Commissioners asking for an injunction to prevent the expenditure of public funds in building the harbor steam plant. The order states that the Board of Water and Power Commissioners and other city officials are restrained from disbursing any public funds, making any contracts or incurring any obligations or liabilities until the hearing for the injunction is held.

The Edison company claims such a plant is not needed, that its construction would be illegal and a waste of public funds, and that its operation would be a violation of the contract made at the time the Edison distribution system was sold to the city. That contract provides that the city will purchase from the Edison company all electricity needed in addition to that generated by the city's own plants on the aqueduct.

Seattle Lets Contract for Skagit Railway Extension.—Contract for construction of the Skagit Railway extension from the existing Gorge Creek plant of the Skagit power project to Diablo Canyon, has been let to Morrison-Knudson Company of Boise, Idaho, for $243,449. The work involves four and three-tenths miles of roadbed, with four Howe truss bridges.

Ambitious Plans for 1927 Made by California Utility

Ambitious construction plans for 1927 have been outlined by the Pacific Gas and Electric Company, San Francisco. One of the most important projects is the inauguration of the four-year program on the Salt Springs development on the Mokelumne River in Amador County, Calif. This includes a 220-ft. rock-fill dam across the river, a reservoir of 50,000-acre-ft. capacity, a 25-mile water conduit, a 44,000-hp. generating plant at Tiger Creek, and the increasing of the capacity of the Electra power house from 26,000 hp. to 44,000 hp. Appropriations for the first two years, which will be devoted largely to preliminary work, total $1,500,000, according to the company's statement.

Work on the Melones power house, being built on an agreement with the South San Joaquin and Oakdale Irrigation Districts, is going ahead on a schedule that calls for completion June 1, 1927.

On the Spaulding-Drum developments Drum Canal is to be enlarged, the two Spaulding power plants are to be dismantled to make way for plants of larger capacity, a third Spaulding plant will be built on the rim of Lake Spaulding, and the capacity of Drum power house increased from 50,000 hp. to 67,000 hp. Spaulding plants 1 and 2 will be replaced this year and the third plant is expected to be ready for operation in 1928. Appropriations already made for the Spaulding-Drum additions aggregate more than $2,000,000.

Other work contemplated includes the enlarging of Bear River canal to enable Halsey and Wise plants to generate to capacity twenty-four hours a day; the completion of Pit 4 dam; the building of new tower transmission lines in the East Bay division, for which $500,000 is to be spent; the rebuilding of Davis substation and other construction in the Sacramento division, covered by an appropriation of $500,000; the construction of the Newark-Coyote line at an estimated cost of $400,000 and a new substation at Monte Vista at $100,000. In the San Francisco division $500,000 is to be spent on new work and $500,000 on operation and maintenance.

Los Angeles Power Bureau Sets Budget at $12,650,000

Budget allotments of the Los Angeles Bureau of Power and Light for 1927 call for a total investment of $12,650,000 in extensions and betterments to generating and distributing facilities.

Ranking as one of the most important features of the power bureau's 1927 construction program will be the erection and equipment of a new standby steam generating plant, it was stated by E. F. Scattergood, chief electrical engineer. This plant, which is planned to have an initial generating capacity of 33,000 hp., is to be erected in the harbor district and will involve an investment of approximately $3,500,000 in buildings and generating units. This is the steam plant installation which has caused the Southern California Edison Company to file an injunction suit against the Bureau of Power and Light seeking to restrain the Bureau from constructing such a plant on the ground that it would constitute a direct violation of the city's agreement with the company made when the city purchased from the company all electrical distribution lines within Los Angeles city limits.

Continuation of the program of constructing a 110-kv. transmission line from its central receiving station on North Main Street to the harbor district, including the cost of new receiving stations along the route, will require $3,200,000.

Additional generating units to be installed by the Power Bureau in two of its hydroelectric plants along the aqueruct during 1927, will call for an expenditure of $1,200,000. Extensions and enlargements to its distributing system will cost approximately $4,500,000, and miscellaneous investments necessary for the provision of adequate service are estimated at $500,000.

Glenn Canyon Site on Colorado River Sought by Arizona

The board of directors of state institutions of Arizona has applied to the Federal Power Commission for a second site on the Colorado River. The first application for preliminary permit covered the site at Bridge Canyon. The more recent application covers the Glenn Canyon site.

This latter project proposes the construction of a rock-fill or gravity-type dam at a point four miles above Lees Ferry. It would be 693 ft. in height and would have a reservoir capacity of 50,501,260 acre-ft. The dam would back up water for 205 miles to a point near the mouth of Green River in Utah. It is stated that the water will be used in connection with the Bridge Canyon project and also for irrigation in connection with the Arizona high line reclamation project.

Exhibit Displays Advantages of Wiring System for Home

An exhibit of a wiring system that attracted much attention and was awarded honorable mention was that entered by the Woods Watkins Electric Company, Porterville, Calif., in the eighth annual celebration of Armistice Day in that city.

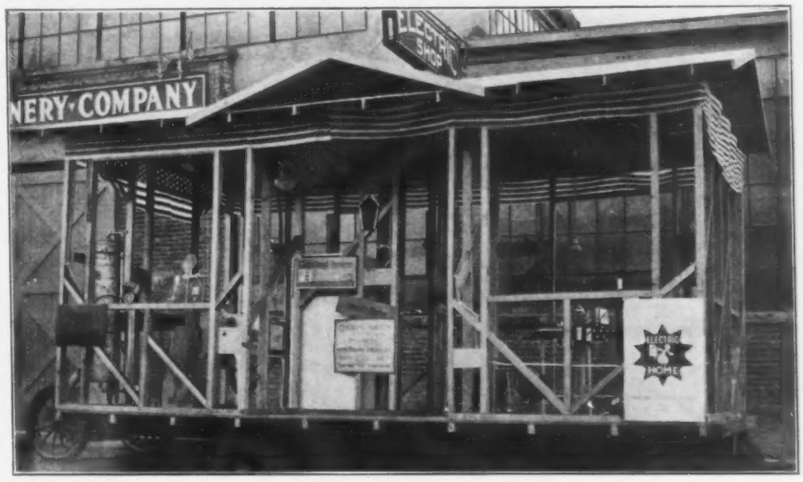
The exhibit took the form of a model electric home arranged to display the advantages of the wiring system advocated by the General Electric Company. The wiring job, complete in every detail, consisted of 100-amp. service, range and water-heater circuits, and one heavy-duty heater circuit. A residence panel was placed in a convenient location in the kichen, with one circuit for lights and one for convenience outlets. There also were outlets for an iron and for an electric refrigerator on separate circuits in the kitchen. All outlets were complete with switches or receptacles and plates, the various appliances being attached to show the public the function of the different circuits.

The appliances shown included range, automatic water heater, 6-lb. iron, radiant heater, toaster, percolator, waffle iron, vacuum cleaner, and refrigerator.

The lighting equipment consisted of a kitchen unit with a bracket over the sink, a fixture over the table in the dining room as well as two wall brackets, and a porch fixture.

After the wiring had been completed and duly inspected, the Woods Watkins Electric Company was given two Red Seal placards which were displayed in prominent positions.

The exhibit was mounted upon one of the company's service cars which, after the parade, was parked where people could enter the house and be shown the advantages of the wiring system. Results were evident the very next day when a customer entered the store and asked to have his new home equipped with the "same stuff you had in the parade."



This exhibit, entered by the Woods Watkins Electric Company, Porterville, Calif., in the eighth annual Armistice Day celebration in that city, showed a complete wiring system for a model electric home.

Six-State Colorado River Pact Repudiated by Utah; Other Developments

Through the passage of the Auerbach Bill by the Legislature and its immediate signing by Governor Dern, the State of Utah has rescinded its ratification of the six-state pact made by states of the Colorado River basin in connection with the allocation of the waters of that river.

It is pointed out by proponents of the Auerbach Bill, which was passed with practically no opposition, that the repeal of Utah's adherence to the six-state pact does not mean necessarily that it has been abandoned; and that if it is determined later that the six-state pact and amended Swing-Johnson Bill properly protect Utah's future in the Colorado River resources the Utah Legislature will be in session for some time yet and could reconsider its action. The bill was passed as an emergency measure to forestall threatened passage of the Swing-Johnson Bill, the California measure providing for a dam at Boulder Canyon, that it was believed would be detrimental to Utah's interests.

The withdrawal of Utah will have the effect of rendering ineffective the Swing-Johnson Bill, if that bill is passed, for the reason that it provides that no money shall be appropriated for the project until six states have ratified unconditionally the so-called six-state pact. California in 1925 ratified the six-state pact with the reservation that its ratification should not become effective until after a reservoir of 20,000,000-acre-ft. capacity at or below Boulder Canyon had been authorized for construction by the United States. That state takes the stand that its conditional ratification will become unconditional immediately upon the passage of the Swing-Johnson Bill and the affixing of the President's signature, according to a statement attributed to Governor Young. The bill has been up for hearing before the House rules committee on the advisability of giving it preferential legislative status, but as this paper goes to press no decision has been announced by the committee. Advices from Washington state that all indications are that the Swing-Johnson Bill cannot be passed at this session.

In a renewed effort to reach an agreement on the allocation of the waters of the Colorado River between the states of Arizona, California and Nevada the commissions from those states began a new series of conferences Jan. 19. Newspaper men have been barred from the sessions, but official statements on the progress of the negotiations will be issued twice daily. The Arizona commission consists of H. S. McCluskey, chairman of the industrial commission of that state; Thomas Maddock, engineer; and John B. Gust, merchant of Phoenix. California is represented by Earl C. Pound, president of the Imperial Valley Irrigation District; James A. Anderson, Los Angeles attorney, and Arthur P. Davis, formerly connected with the U. S. Reclamation Service and now general manager of the East Bay Municipal Utility District, Oakland. Just before the California Legislature adjourned for its 30-day constitutional recess it authorized the governor to appoint two additional members to the California commission. The governor made no announcement of his appointees, but it was stated unofficially that the two new members would be Dr. S. M. Jennings, president of the Coachella Valley Irrigation District, and Mr. Finley, county supervisor of Orange County. The Nevada commissioners are Charles P. Squires, E. W. Clark, C. B. Henderson and G. W. Malone. Mr. Squires has been elected chairman of the tri-state conference.

Recent press dispatches from Nevada state that a bill to repeal that state's approval of the six-state pact has been introduced into the Senate.

After a week's duration the special session of the Arizona legislature called by Governor Hunt for Jan. 3 was adjourned without result, according to press reports. No legislation bearing on the Colorado River was enacted, and all the governor's proposals, including the recommendation for an open appropriation to protect Arizona's rights in the river, were tabled.

Decision Rendered in Utah Suit Involving Water Rights

A decision has been rendered in the district court at Logan, Utah, in the case of Logan, Hyde Park and Smithfield Canal Company and other water users versus Logan City, in which suit the Utah Power & Light Company, at the request of Logan City, was made a cross-defendant. The decision in substance confirms a supplemental right of the Utah Power & Light Company to divert and use for power purposes 125 sec.-ft. of the waters of Logan River, and decrees that whatever right Logan City has to impound, divert, or use the waters of Logan River for power purposes is subsequent, inferior and subordinate to the rights of the plaintiffs and cross-defendant.

Suit was brought to restrain the city from storing water in its dam above the normal level, and to confine the flow through the wheels of its power plant to the natural flow available in the river. The city is enjoined and restrained from so operating its diverting works and power plant on Logan River as to impound, obstruct or impede in any manner the free and natural flow of the waters of the river, to which the plaintiffs and cross-defendant are entitled, respectively, at their several points of diversion, as fixed and determined in this and a former decree of Feb. 21, 1922.

The Logan city officials have announced they will appeal the case to the Utah Supreme Court.

Edison Company Plans to Spend $42,000,000 in 1927

Expenditures totaling $42,000,000 are planned by the Southern California Edison Company for the ensuing year, according to a statement issued by R. H. Ballard, executive vice-president and general manager.

Construction work on the Big Creek-San Joaquin project in the high Sierra, northeast of Fresno, and on the third 220-kv. transmission line is to be continued during 1927. This work will require $15,000,000. Work is to be started on a fifth power plant of the Big Creek-San Joaquin series that will have a capacity of 112,000 hp. and will be ready for operation early in 1928. The 220-kv. transmission line stretching 270 miles across country from the power palnts in the high Sierra to southern California, was partially completed during 1926. Ninety-five miles of line extending from the receiving substation just north of Pasadena to Magunden substation, six miles east of Bakersfield, were completed and energized early in November. Work on the northern end of the line is to be pushed throughout 1927 so as to have the line completed coincident with the completion of the new hydro plant in the high Sierra.

Efficient and economic operation of an electric utility demands that a proper balance be maintained between steam and water power generation. More than seven and one-half million dollars is to be spent at Long Beach steam plant where a new 125,000-hp. unit is to be built. This is but the first of eight similar units which the company plans to construct at Long Beach as the need for additional energy develops.

New substations will be built or existing stations will have their capacities materially increased during the coming year. These substations, numbering about seventy-five, and the lines distributing power from them are some of the items for which $16,000,000 for additions and miscellaneous betterments throughout the entire system will be spent.

The plant ultimately will have a capacity of more than 1,250,000 hp.

Par Value of Pacific Gas and Electric Stock Changed from $100 to $25.—Pacific Gas and Electric Company has been granted permission by the Railroad Commission to re-issue its present common and preferred stock, having a par value of $100 per share, for an equal amount of stock of par value of $25 per share in the ratio of four shares of $25 stock for every share of $100 par value. There is now outstanding and subscribed for $62,441,431 of first preferred stock, and $52,865,115 of common stock of the company. Exchanges may be made either at the company's transfer office, 245 Market Street, San Francisco, or at the Bankers Trust Company, 16 Wall Street, New York City, upon surrender of old certificates for that purpose.

Portland Company Re-organizes Commercial Department

Recent changes in the organization of the commercial department of the Portland Electric Power Company, Portland, have enlarged that department and have paved the way for expansion as necessity requires. The first step was to make the head of the department general sales manager instead of sales manager. A. C. McMicken, for many years holding this position under the old title, continues in it under the new and in addition has supervision over the Tualatin Division and Vancouver Division of the company with R. R. Easter, division manager at Hillsboro, Ore., and C. C. Turlay, division manager at Vancouver, Wash., reporting to him. To handle the ever-increasing detail of the department adequately the next step created two new positions, effective Jan. 1, 1927, merchandise sales manager, and division sales manager, Portland Division.

J. L. White, formerly manager of the Portland appliance store, was appointed merchandise sales manager, with jurisdiction over the merchandising of lamps, appliances, ranges and all merchandise sold in all the electric stores and district and division offices of the entire company. Mr. White also will supervise and direct all merchandise selling campaigns conducted by the company.

The position of division sales manager of the Portland Division will carry with it responsibility for the light and power sales organization and the entire commercial department in Portland and in the district offices of Oregon City and Gresham, Ore., which are included in that division. G. E. Sullivan, formerly district manager at Oregon City, has been appointed to fill this position. No other division sales managerships have been created at this time for the other three divisions of the company at Salem, Ore., Hillsboro, Ore., or Vancouver, Wash., but under the plan of organization these can be created as needed.

Power Bureau Finishes Two-Year Improvement Program

Necessitating the expenditure of more than $2,500,000, a two-year program of extensions and betterments to the downtown distributing system of the Los Angeles Bureau of Power and Light recently was brought to a close, according to an announcement made by E. F. Scattergood, chief engineer for the bureau. This work practically has quadrupled the capacity of the downtown and commercial districts of the city, and since the major portion of this work has been with underground distribution systems it has been extremely expensive, it was declared.

One of the principal features of the power bureau's construction in the downtown district has been the changing over from a 2,300-volt distributing system to a 4,600-volt system. In doubling the voltage of its lines, according to Mr. Scattergood, the bureau has increased the carrying capacity of its cables 400 per cent.

As a part of its general construction work in the downtown area, the power bureau has built and placed in service a large new distributing station at 936 Francisco Street, is rebuilding and enlarging a second station at 120 East Fourth Street, and now has under construction a third new distributing station, to serve the downtown district, near the intersection of First and Boylston Streets.

S.E.D. Announces Resignation of W. L. Goodwin

The board of directors of the Society for Electrical Development announces the resignation of William L. Goodwin, who for eight years has been operating vice-president in charge of the society. In regretfully accepting this resignation the board adopted a resolution paying tribute to the fundamental contributions which Mr. Goodwin has made during this period to the development of the co-operative organization of the electrical industry. Among other things the resolution says:

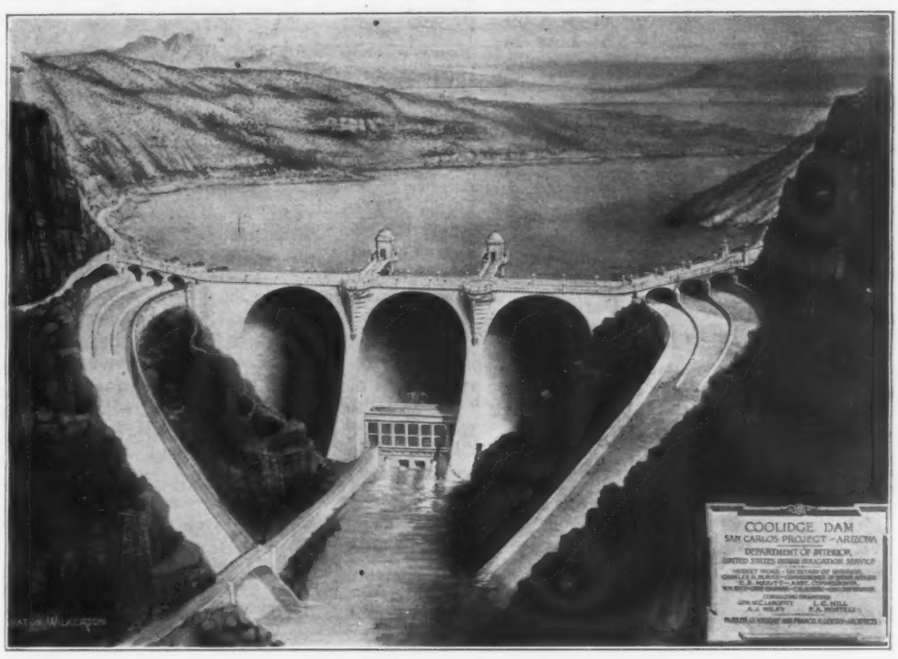
> This leadership has had conspicuous expression in the inauguration of the annual conferences of electrical leagues held at Association Island through which the society has been for five years the national headquarters for league development and service and has assisted in the rapid growth of the local league movement; in the establishment of the Red Seal Plan on a national basis as an approach to the great market for more adequate wiring in the home; and in the conception of the "market development plan," now in process of refinement, to bring about a co-ordination of the commodity campaigns of manufacturers and their proper relations to the leagues.

Mr. Goodwin's resignation takes effect April 1, with leave of absence from Jan. 1.

Philbrook Dam Near Chico, Calif., Completed.—Construction of the 90-ft. earth-filled dam being erected by the Pacific Gas and Electric Company at Philbrook Creek, a tributary of the Feather River, 50 miles northeast of Chico, Calif., has been completed. The dam will impound 5,060 acre-ft. of water, which will be used in connection with the operation of the company's Centerville and De Sabla hydro-electric power plants. The cost of erection is set at $250,000.

Multiple Dome Dam

Multiple dome design adopted for Coolidge dam on U. S. Indian Irrigation Service's San Carlos project in Arizona. Water will be impounded for irrigation of 100,000 acres, about equally divided between Pima Indians of Gila River Indian reservation and white owners of adjoining lands in vicinity of Florence and Casa Grande. Maximum height of dam 250 ft., 220 ft. above stream bed, length along crest 580 ft., exclusive of spillways, each 150 ft. wide. Distance from rear of dome along base of dam to toe of buttress 286 ft. Clear span of arch elements forming dome varies from 70 ft. at heel to a maximum of 150 ft. at "shoulder" of dome. Photograph through courtesy of Architect and Engineer.



California Railroad Commission Elects New President

Following the re-appointment to the California Railroad Commission by Governor Richardson of Commissioners Harley W. Brundige and Leon O. Whitsell, whose terms expired Dec. 31, 1926, that body has reorganized and inaugurated a new policy of rotating the presidency among the commissioners in the order of their seniority.

The duties and responsibilities of the Railroad Comissmion have increased so rapidly in recent years, and the volume of the work handled by the commission

EZRA W. DECOTO

has grown to such large proportions, that the office of president throws upon the incumbent a tremendous amount of added work and responsibility. It is the unanimous opinion of the commission that this work and responsibility should be shared by every member of the commission.

In carrying out the new plan Ezra W. Decoto, who has been a member of the commission since January, 1925, has been elected president for 1927.

Mr. Decoto's career has been active and interesting. Member of a California pioneer family, he was born in the town of Decoto in Alameda County and educated in the public schools there. After graduation from the high school at Centerville he taught school for two years to secure funds to enter the University of California, from which he was graduated with the class of 1900. During vacations he worked as a well borer so that he could continue his college work. In 1900 he entered Hastings Law College and was graduated two years later. During that period he was principal of the Oakland Evening High School, teaching at night to keep himself in college. In 1901 he was appointed graduate manager at the University of Califonia and continued in that capacity in charge of all athletics and all student activities until 1906. From 1903 to 1906 he served as probation officer of Alameda County, and in the latter year was appointed prosecuting attorney of the City of Oakland. He held that position until 1918 when he was appointed district attorney, was elected at the primary that year and re-elected in 1922. He resigned from that office in January, 1925, and shortly after took up his work with the Railroad Commission.

Commissioner Whitsell, who is next to President Decoto in seniority, will be elected as president during 1928, and Commissioner Thomas S. Louttit will serve as president during 1929. The new policy was adopted at the suggestion of Commissioner Brundige, who has served as president for the last two years.

Bond Issue of $25,000,000 Is Part of Financing Plan

Following out the financial program of the Western Power Company approved last November by the California Railroad Commission, the San Joaquin Light & Power Corporation, Fresno, which is controlled by that company, has placed on the market an issue of $25,000,000 unifying and refunding mortgage 5 per cent gold bonds, series "D." This issue will constitute a first mortgage against 95 per cent of the properties of the company and a direct mortgage against the remainder, subject only to $2,210,000 underlying closed mortgage bonds. This financing will result in a reduction of interest charges of about $200,000 annually.

Proceeds of the issue will be used to redeem $14,225,000 first and refunding mortgage bonds and $8,430,500 unifying and refunding bonds. A portion of the proceeds of the new issue remaining after the refunding operation will provide additional funds for the extensive development plans now under way.

Upon completion of this financing, the first mortgage and the unifying and refunding bonds will constitute the only funded debt of the company.

California Power Companies Make Rate Reductions

Effective Jan. 20, 1927, Truckee Electric Light & Power Company, supplying electric service in the town of Truckee, Calif., and immediate vicinity, reduced its rates voluntarily for general lighting service, following negotiations with the Railroad Commission. The net result of the reductions will be the lowering of monthly bills for consumers of all classes of lighting service 20 cents a month, except those falling below the minimum. The company has also filed with the commission a rate applicable to street lighting, to take care of the demand for such service.

Effective Feb. 5, 1927, the Coast Counties Gas & Electric Company, Santa Cruz, Calif., has reduced and revised its electric cooking and heating rates so as to make them identical with those of the Pacific Gas and Electric Company operating in adjacent contiguous territory.

Deer Creek Water System Sold.—Pacific Gas and Electric Company has been authorized by the Railroad Commission to transfer its Deer Creek ditch water system in Nevada County to Nevada Irrigation District for the sum of $350,000.

San Francisco General Electric Makes Personnel Changes

The title of commercial vice-president of the General Electric Company has been conferred upon James A. Cranston, for the last three years Pacific Coast manager of that company, with headquarters in San Francisco. He will continue supervision of General Electric activities on the Pacific Coast, however, maintaining his offices in San Francisco.

Mr. Cranston has been identified with the electrical industry since 1888, having begun his activities during that

JAMES A. CRANSTON

year with the Thomson-Houston Company, forerunner of the General Electric Company. A year later he was transferred to Portland, Ore., as sales agent for that company and held that position until the organization of the General Electric Company in 1892 when he joined its Portland force. Eight years later he was made manager of the Portland office. For nineteen years he served in that capacity and at the end of that period was appointed Northwest district manager. In 1923 he took over the duties of Pacific Coast manager for the company, succeeding Dr. Thomas Addison, retired.

H. L. Monroe, manager of the Chicago district for the General Electric Company, and Theodore Beran, manager of its New York district, also have been made commercial vice-presidents of the company.

To make the arrangement of departmental activities in the San Francisco office conform with those in the Schenectady headquarters the following appointments have been made by R. M. Alvord, local manager: A. G. Jones, since 1922 assistant sales manager in charge of central station activities, has been made manager of the central station department; A. V. Thompson, for the past four years assistant sales manager in charge of electric railway sales, is now manager of the railway department; M. Rhine, who has been assistant sales manager in charge of industrial department activities since 1922, has been promoted to the managership of the industrial department; and F. E. Boyd, since 1912 in charge of motor sales, has been made manager of motor sales, industrial department.

House Organ Is Inaugurated by Grays Harbor Company

"The Synchronizer" is the title of "a fortnightly bulletin for the employees of the Grays Harbor Railway & Light Company and associated companies" recently inaugurated by that company and edited by George B. Sanford. Its purpose, as announced in the foreword by W. W. Briggs, vice-president and general manager, is to keep all members of the organization informed on matters of common interest.

It is written in friendly style, and one page is devoted to activities of women employees. The benefits to be derived through membership in the Employees' Medical Aid Association are pointed out in the first number, among other things, and the second announces the gift by the company of fully paid life insurance policies to employees. Policies in the sum of $500 were given to all employees in the employ of the company for one year or more, and in the sum of $250 to employees of less than one year.

Pasadena Light Department Plans Addition of New Unit

The Light and Power Department of the City of Pasadena, Calif., is contemplating the addition of a 15,000-kw. unit to its present steam plant. This fact is brought out in a report on the rate of growth of the business recently issued by B. F. DeLanty, general manager of the department. In pointing out the need for immediate action at this time Mr. DeLanty stated: "Considering that our peak load during 1925-26 (July to July) amounted to 11,100 kilowatts, it is quite evident that our growth has been increased as we had anticipated, thus giving us a full load on our most economical unit. Our plans for the completion of the duplicate unit are being prepared, and we should be authorized to proceed with the installation of the 15,000-kw. unit early in 1927, as it will be approximately nine months from the date the order is placed for this unit before it can be put in operation."

Pacific Coast Electrical Association

Common Grounds and Inductive Co-ordination Keep Engineering Section Busy

One hundred and sixty-seven persons attended the luncheon of the Engineering Section of the Pacific Coast Electrical Association held in the Paris dining room of the Fairmont Hotel Jan. 13, 1927. S. Waldo Coleman, president of the association, was the honor guest and principal speaker of the occasion. Mr. Coleman touched briefly upon several of the problems that face the electrical industry, placing emphasis upon the necessity of a well planned and coordinated energy sales policy throughout the industry and stating that a well balanced relation between the commercial and engineering departments of electrical utilities is essential for sound growth. Mr. Coleman pointed out that, inasmuch as at the present moment the engineering department has caught up with the demand previously imposed by the commercial department and while the next move, so to speak, is up to the commercial department, a great responsibility rests upon the engineers due to the vast amounts of new capital being expended in the extension of the industry's power facilities. Mr. Coleman predicted a minimum average of $75,000,000 annually in California for the next ten years to be expended in developing and extending power systems. P. M. Downing, vice-president of the association, and S. H. Taylor, secretary, also were prominent guests at the luncheon.

As a fitting climax to the successful sessions of the various committees the entire personnel of the Engineering Section that was in attendance at the conclave joined with the membership of the San Francisco Section of the American Institute of Electrical Engineers and other interested persons in a trip to the new Ryan Laboratory at Stanford University Friday evening, Jan. 15. The prospect of that evening's program attracted an attendance in excess of 500 persons who journeyed to Stanford to pay respects to Dr. Ryan. Following dinner the crowd gathered at the new 2,000,000-volt laboratory where Dr. Ryan gave a brief exposition of the history of the development of the laboratory, described briefly the operating characteristics of the equipment therein installed and gave about a half-hour's demonstration of the corona and other characteristics of voltages up to something above 2,000,000.

As regards the activities of the various committees, these are covered best in the following reports prepared by the committee chairmen.

Accident Prevention Committee

By M. S. Slaughter,

The Southern Sierras Power Company, chairman.

Practical adaptation of accident prevention and the study of the problems of advantageously bringing to the attention of construction and operating men the practical features of accident prevention consumed the entire session of the committee. Information derived from a survey was presented at the meeting showing that accident-prevention organizations are functioning among a majority of the companies and that 97 per cent of the 30,000 electrical employees on the Pacific Coast are being reached.

One of the greatest difficulties in the co-ordination of accident prevention work is the lack of uniformity of records as kept by the different companies. Statistics are being gathered by the accident prevention committee that will permit the comparison of the severity and cost of accidents and thus enable specialized work on the part of the committee. The committee has recommended the adoption of the international rating chart for the keeping of records regarding the severity of accidents, the number of days lost per man and the causes of accidents. The use of such a chart by all member companies will make available to the accident prevention committee a vast amount of information each unit of which may be compared and studied with regard to each other unit, thus greatly facilitating the committee's work.

With a further study of the causes of accidents, such as will be possible through the adoption of a uniform record sheet, the committee will be able to determine definitely the more important causes of accidents and will be able to give special consideration to the preparation of practical methods of prevention to meet these particular needs in the order of their prominence. The accident prevention committee plans to work in full co-ordination with all other committees of the Engineering Secelon in the preparation of practical accident prevention rules.

Electrical Apparatus Committee

By H. A. Laidlaw,

Pacific Gas and Electric Company, chairman.

Interim reports were read and opened for discussion by the various subcommittee chairmen as follows:

Oil Circuit Breakers, H. T. Sutcliffe; Relays, H. S. Lane; Station Design and Practice, H. L. Sampson; Operating Methods, Routine and Experiences, W. D. Skinner; Transformers and Regulators, R. C. Denny.

In addition to these subjects, the committee is considering this year the subject of fire protection and prevention, but owing to the absence of the chairman of this subcommittee, C. S. Johann, this subject was not discussed at these meetings.

At the morning meeting of January 14, E. A. Crellin presented a very interesting paper describing a new fully automatic power house to be installed by the Pacific Gas and Electric Company and known as Spaulding No. 2.

Hydraulic Power Committee

By J. M. Gaylord,

Southern California Edison Company, chairman.

A message from H. L. Doolittle, chairman of the N.E.L.A. hydraulic power committee, expressed appreciation of the work of the P.C.E.A. hydraulic power committee and requested continued cooperation by active work on national subjects and the suggestion of new subjects for study. A Pacific Coast meeting of the national committee was suggested and is strongly urged by the P.C.E.A. hydraulic power committee. The San Francisco meetings in general were devoted principally to the consideration of the reports of subcommittees.

Information regarding pressure tunnels is being collected by a subcommittee. Discussion was most active on this particular subject and some interesting problems were discussed by operating engineers. Efficient handling of stored water was presented as a draft of a final report. Also, the theoretical discussion of silt deposits has been finished. Tests of existing settling basins will complete the study of this subject of silt deposits. Penstock valves have been adopted as a national subject and the work is well under way with R. M. Peabody as chairman of the National subcommittee on that subject.

Water-hammer tests conducted by the Pacific Gas and Electric Company and the Southern California Edison Company made available some interesting figures which were presented by Mr. Peabody and Mr. Wilkins. These actual test results showed close agreement with the theory that was evolved and covered by last year's hydraulic power committee. Mechanical reliability of hydroelectric units and the subject of penstock painting are being actively followed in co-operation with the national committee.

Trash racks and various other subjects suggested for future consideration were discussed somewhat extensively by the committee in closing the meeting. In selecting subjects for future study, care-

ful consideration was given to the practical and direct usefulness of the proposed studies to the designing and operating engineers.

Inductive Co-ordination Committee

By L. J. Corbett,

Pacific Gas and Electric Company, chairman.

A full report was presented of tests made in August 1926 on a signal circuit and a power crcuit in Northern California after the order for moving the signal circuits was carried out. The open-circuit voltage to ground on the signal circuit was reduced to about one-sixth its former value, largely due to the move. Tests of inductive relations between distribution circuits and a phantom group were conducted jointly in southern California by a power and a communication company. The conclusions were that the installations of an exposed-line transposition scheme would improve the situation greatly. One case pending with one of the power companies relates to multiple grounds and another to the division of cost of stringing a neutral wire on the 4-kv. system desired for the relief of the communication company.

Need for a meter suitable for the measurement of neutral current in accordance with General Order 52 of the California Railroad Commission was brought out in discussion. Such a meter must measure small currents, withstand heavy transients, and operate accurately over a wide frequency range.

Radio interference experiences of different companies have been quite similar. A letter from Chairman Hooven of the national subcommittee was read showing that a majority of radio troubles is directly traceable to household appliances and to defects within radio sets themselves.

The Pacific Radio Trade Association's plan for handling radio complaints in San Francisco was explained. The dealer and the association through their experts investigate the complaint first. The company responsible is not notified until the noise is traced definitely to its circuits. Expense of the 3-months trial of the plan is carried jointly by the power companies and the association. The December report shows that the association's expert had the usual difficulties in this work and that these are being made more familiar to the dealers through this joint plan.

In power company communication there was little new relating to wire communication. Power line carrier-current systems were reported upon, but as the two major trial installations are not yet completed present reports are incomplete. Power companies using space radio are to report for the Fresno meeting.

A review of the Chicago meetings was given by the chairman who touched upon the following points. Current cases between power and communication lines form a large part of the discussions of the national committee, as these usually are decided by agreement or compromise between the two parties whose interests are involved. Still there are denunciations of the California law (General Order No. 52) and Easterners do not seem to appreciate the smoothness of its working. The need of trained personnel in this subject was stressed and the further need of popularizing it so it would be better understood by executives. Automatic train control is becoming of prime importance. Recent tests at Elmira, N. Y., indicated that one of these systems operated by a.c. at 60 cycles was susceptible to serious disturbances from a 60-cycle line parallel to the track, causing false signals to be produced in the locomotive cab. By designing the equipment to operate at a frequency different from the commercial frequencies of 25 and 60 cycles or their odd harmonics this difficulty can be avoided. Experiments are to be made to determine a satisfactory frequency for this purpose. The order of the Interstate Commerce Commission for the installation of control systems makes it highly desirable for the power industry and the railroad industry to co-operate in the selection of a signal-circuit frequency that will obviate the possibility of inductive troubles.

The Minneapolis tests of grounded power circuits and exchange-telephone circuits were abstracted and discussed quite fully. S. B. Hood of Minneapolis, who took part in the tests gave some interesting side lights on the investigation which were discussed by D. I. Cone from the telephone standpoint. As brought out by Mr. Cowles these tests have an important bearing upon the subject of common primary and secondary grounds which now is being discussed with reference to its inclusion in the revision of General Order No. 64. In general the report showed that: (1) Bad situations can be reduced tremendously by proper changes in both circuits, say from 100 per cent to a fraction of 1 per cent; (2) metallicizing and balancing the telephone line is far more effective than metallicizing and balancing the power line; (3) the size of the loop (phase wires and neutral return) is important, indicating the advantage of having the neutral close to power wires; (4) proper maintenance of both power and telephone circuits is essential for avoidance of inductive troubles between grounded-neutral power systems and exchange-telephone circuits.

Meter Committee

By A. J. Hall,

Ontario Power Company, chairman.

Progress reports were submitted by all subcommittees of the meter committee outlining the present status of their work.

Educational work is to continue this year in a manner similar to that pursued last year. Two meter courses will be held, each probably covering both elementary and advanced work, one at the University of California in Berkeley and the other at California Institute of Technology at Pasadena.

Periodic testing of meters is becoming of greater interest and the studies of this subcommittee should result in the determination of a proper test that will satisfy all of the requirements and result in some economies. The transportation of meters to the consumers' property is becoming more systematic and the practice of utilities as regards methods and means used is being studied by the committee.

The subject of maintenance relay, testing and adjustment to insure proper operation is requiring close study on the part of this subcommittee. Utilities are depending to an increasing extent upon the meter departments for difficult measurements of many kinds as well as for special tests and investigations. Several very interesting papers were presented at the San Francisco meeting covering some of these special investigations.

New developments in methods and equipment are under constant review by that subcommittee and a completed report is expected by April.

Overhead Systems Committee

By C. E. Young,

Pacific Gas and Electric Company, chairman.

Eight subjects were discussed during the meetings of the overhead systems committee. Reports were presented by the chairmen of the subcommittees in charge of these subjects and in each instance a lively discussion resulted.

Revision of construction rules and joint pole practice was the first subject discussed. It was stated that the revision of General Order 64 is completed and that tentative copies should be ready for distribution by March 1. The necessity of close co-operation between the interests involved in joint pole work was stressed, particularly in planning the lines with thought as to future needs. The advisability of joint use of poles for voltages higher than now is customary also was advised.

A very interesting report on 220-kv. line construction and operation was next presented by H. Michener.

Standardization of pin and insulator threads was the third subject and it resulted in a spirited discussion of ways and means of continuing the study. Finally it was decided to complete the report and turn it over to the N.E.L.A. committee as the work is national in scope.

Discussion of line switches and protective equipment centered on air-break switches and their use. The fact that some of these switches cause radio interference was touched upon and methods of correcting the condition were discussed. Also some experiences in breaking charging currents with air switches were related.

The second day's session was opened with a report on corrosion of steel towers and line hardware. This proved a live subject and resulted in a general discussion of trouble encountered and steps that were being taken to correct or minimize the trouble.

The subject of grounding of distribution circuits was limited to the question of neutral grounding, both of primary and secondary. It was recommended that there should be consideration given to the use of a common grounded neutral for 4-wire distribution circuits and that such changes as were necessary be made in the proposed revision of General Order 64 to allow of such practice. Considerable discussion ensued as to the probable results of such practice. It was agreed that such a system would be very desirable to the electric utilities. From experience in other places, particularly Minneapolis, it seems proved that proper steps can be taken so that communication lines would not be harmed.

The study of treated and untreated poles covered tests and records of the life of poles and methods of preservative treatment. The destruction of poles by termites in certain areas was touched upon and the possible means of obviating this trouble was discussed.

A brief outline of experiences with live-line tools and live-line maintenance was presented. It was stated that live-line maintenance gradually is becoming more necessary as uninterrupted service is being required. Tools for safely handling such work on lines of almost any voltage now are available. It was stressed that in such work continued vigilance was necessary to prevent carelessness by workmen.

Prime Movers Committee

By C. W. Wiggins,

San Diego Consolidated Gas & Electric Company, chairman.

Reports were received from the subcommittees studying the following subjects: Heat Balance and Station Auxiliaries, Boiler and Turbine Room Instruments, Standby Plant Design and Operation, Feedwater Treatment, and Condensing Equipment.

F. G. Philo, chairman of the heat balance and station auxiliaries committee presented a report with ten sheets of curves showing results to be obtained from stage bleeding and feedwater heating with turbines of from one to four bleed points.

This report is the result of a great deal of study and research work in the Long Beach plant of the Southern California Edison Company, and when it is published it should be a valuable guide to engineers planning new installations or operating plants with bleeder turbines. Mr. Philo stated that air preheaters are proving more desirable than economizers since heating of feedwater with steam bled from turbines has become standard modern practice.

Mr. Philo also presented a report covering the results of investigations as to the best plan for getting the average temperature of fuel oil in storage tanks and correcting for temperature. He stated that the true average temperature of oil in a tank will be the average of temperatures taken in a vertical line in any part of the tank.

J. W. Andree could not be present and his report on standby plant design and operation was read by Mr. Philo. The report deals thoroughly with the best methods of keeping standby plants in good condition and best methods of operating. Mr. Andree believes that no plants are likely to be built as standby plants only, but suggests that when a new plant is designed the fact that the plant probably will be used as a standby plant a few years later should be taken into consideration. Included in the report was a curve showing results of a load-acceleration test on a 1,500-hp. boiler at Long Beach.

A report on boiler and turbine room instruments was received from Chairman Frank R. Knight, who could not be present. Discussion of this report brought out the opinion that an accurate and reliable oil meter is not yet available. Various types of CO_2 recorders were discussed. Mr. Philo stated that he did not consider any CO_2 recorder satisfactory unless it would record the combustible gases. Mr. Knight recommended that plant efficiency be recorded in B.t.u. per kw-hr.

A 4-reel moving picture showing the factory construction of Babcock and Wilcox boilers proved of wide interest. After the picture was shown H. S. Markey presented a report on feedwater treatment. The report contained statements of methods used by several of the Pacific Coast companies. After the reading there was some discussion of caustic embrittlement in boilers.

A report was received from Scott Jensen on condensing equipment. Mr. Jensen could not be present and as the report was complete only a few of the points in it were spoken of by Mr. Philo, who was asked to present it.

Safety Rules Committee

By E. J. Crawford,

San Joaquin Light & Power Corporation, chairman.

Efforts of the safety rules committee toward the establishment of a uniformity of methods for all member companies are beginning to be noticeable. A report of the subcommittee on test methods showed a gratifying uniformity of methods for the largest percentage of meters in service. The diversity of opinion comes chiefly in the large sizes and higher voltages. It is hoped soon to make definite recommendations and suggestions to the manufacturers regarding test facilities.

Correspondence from the president of the California Association of Electrical Inspectors shows that progress is being made by their subcommittee on a uniform electrical ordinance which they hope to have ready for their March, 1927, meeting. The safety rules committee also is vitally interested in this particular point and expects to study the action of the inspectors at the Fresno meeting in April.

Multiple common grounds for primary and secondary neutrals as recommended by a subcommittee of the overhead systems committee were discussed at some length. The decision of the safety rules committee was to go on record as endorsing the recommendations favoring the multiple common ground from the standpoint of safety. It is the opinion of the committee that the proposed plan is conducive to greater safety than possible with the use of separate grounds.

A summary of the reports of member companies on the method of testing and handling rubber protective equipment showed that all companies recognized the importance of tests, but that due to certain conditions there is no uniformity on test intervals. A full compilation of these reports is to be made and it is hoped that from this tabulation specific recommendations for periodic tests may be made. The re-issue of old equipment also is to be considered.

Copies of the accident prevention committee's tentative code will be supplied to company members for study and is to be reported upon at length at the Fresno meeting in April.

Underground Systems Committee

By N. B. Hinson,

Southern California Edison Company, chairman.

A report describing the a.c. underground system in use in San Francisco was presented by R. P. Lutzi. The system used is a feeder-and-main system on the 4-kv. side with independent transformer and secondary groups. Provision is made for the transference of loads from one feeder to another or from one transformer bank to another but the system it not operated as a network. Discussion aroused by this report brought out the fact that this type of sysem is common among operating companies on the Pacific Coast as it is preferred for Western conditions where operating companies have extensive hydroelectric transmission systems.

Special work being done at Emeryville on duct-line and cable temperatures was described by G. L. Hill. The national committee report on this same subject was abstracted by P. E. Chapman.

Special methods of transformer connections used by the Pacific Gas and Electric Company in which all leads are lead-covered cable was discussed by H. C. Moyer. Mr. Moyer also exhibited a special splice with which he has been experimenting. This splice is being developed so that short lengths of cable may be salvaged by splicing; the splice is of such character that the salvaged cable may be wound upon reels and subsequently drawn into duct-lines without damage to the splice. The splice as developed is practically no larger in diameter than the original cable.

The first half of a report on an electrolysis was presented by Paul Suransky; the second half is to be presented at the Fresno meeting.

A description of the laying of the new 8-mile submarine cable recently accomplished by the Great Western Power Company of California was presented by G. H. Hagar.

The use and advantage of concrete spacers in the laying of fibre duct was described by C. H. Jenkins. Mr. Jenkins also gave further information regarding the installation of 33-kv. cable in Los Angeles and regarding the Kenetron tests. Service requirements of a 30-story office building and the underground installation necessary for such service was described by P. E. Chapman. Discusson of this subject brought forth many expressions to the effect that a much closer co-operation between the power companies and the architects and electrical engineers engaged in planning these new buildings should be brought about in order that service requirements may be met adequately.

P.C.E.A. Commercial Section to Meet March 9-10.—The spring meeting of the Commercial Section of the Pacific Coast Electrical Association will be held in the Chamber of Commerce Building, Los Angeles, March 9-10, 1927. According to H. K. Griffin, section chairman, a program fully as excellent as that of the fall meeting at Santa Cruz is being prepared.

Transportation Section, P.C.E.A., to Meet.—A meeting of the Transportation Section will be held on the tenth floor of the San Joaquin Light & Power Corporation's building in Fresno, Calif., Feb. 17-18, 1927, according to announcement of J. M. Wainscoat, secretary. Sessions will begin at 9 a.m.

House Organs to Be Discussed at Advertising Meeting

House organs will be analyzed, discussed and otherwise considered at the afternoon general session of the Advertising-Publicity Section, P.C.E.A., to be held at the Palace Hotel, San Francisco, Feb. 25, 1927, according to a bulletin issued recently by R. E. Smith, advertising manager, Southern California Edison Company, chairman of the section. The general meeting at which this subject will be discussed by well qualified speakers will be an open meeting to which anyone in the industry interested in the subject is invited.

In order to give the subject the benefit of expert testimony J. P. Coghlan, assistant to the president, Pacific Gas and Electric Company, and editor of "P. G. and E. Progress," and Edward O'Day, editor, "Bubbles," Spring Valley Water Company, will be the principal speakers. Discussion of various forms of house organs and their relative merits will follow the principal addresses of the afternoon. Frederick S. Myrtle, editor of the Pacific Service Magazine, is to be chairman of the afternoon session.

Morning sessions of the Advertising-Publicity Section meeting will be confined to business, reports of special committees and discussion of plans for activities at the annual convention in June.

Northwest Electric Light & Power Association

March 10-11 Set for Meeting of Engineering Section

At a meeting of the executive committee of the Engineering Section, Northwest Electric Light and Power Association, held in Spokane, Jan. 7-8, 1927, the dates and place for the third annual general meeting of the section were set as March 10-11, 1927, at Portland. The hotel at which the meeting will have its headquarters has not yet been determined. The general meeting will follow its predecessors in form, that is, an hour or more will be allotted to each committee in which to present formal papers on subjects pertinent to its work, which are to be followed by prepared and impromptu discussion. It will be the aim this year to shorten the time for the formal papers so that a longer time will remain for the discussion. Sessions will start at 9 a.m. and run to 6 p.m. with an hour and a half for lunch.

The morning session, Thursday, March 10, will open with an address of welcome by L. T. Merwin, vice-president and general manager, Northwestern Electric Company, Portland, and a response by D. C. Green, vice-president and general manager, Utah Power & Light Company, Salt Lake, president of the association. The balance of the session will be given over to the overhead systems committee, under which will be presented, "Methods of Testing Insulators and Results of Tests of Equipment," by F. O. McMillan, associate professor of electrical engineering, Oregon Agricultural College, Corvallis; "Fire-Killed Poles," by R. L. Gamble, assistant engineer, The Washington Water Power Company, Spokane; "Standardization of Distribution Line Materials and Methods," by H. R. Wakeman, superintendent of wires and conduits, Portland Electric Power Company, Portland.

The afternoon session will open with an address by a representative of the Engineering National Section. The committee on co-operation with regulatory bodies then will present from one of the state commissions an engineer who has not yet been selected, to talk on the relations with utility companies. The meters committee, in addition to presenting a formal paper on "Experiences in Polyphase Metering," will set aside a time for general discussion on the feasibility of establishing a short course for metermen in the colleges and universities in the territory. The balance of the session will be utilized by the hydraulic power committee with the following papers: "Silt Deposits and Methods of Elimination," by J. H. Siegfried, superintendent of power, Pacific Power & Light Company, Pasco, Wash.;

"Demonstration of the Proebstograph*," by D. W. Proebstel, superintendent of tests, Portland Electric Power Company; "Allocation of Water for Irrigation, Power and Domestic Use," by J. C. Stevens, consulting engineer, Portland; and "High Head Design, with Special Reference to Rubber Seal Rings," by a representative of the manufactrers not yet determined.

The morning session, Friday, March 11, will be opened by an address by a power company executive not yet chosen. The accident prevention committee will follow, having scheduled a paper by George I. Drennan, field superintendent, Pacific Power & Light Company, Walla Walla, Wash., on "Requirements in Accident Prevention Methods in Different States." After this the Insull Medal will be presented to K. P. Simms, Mountain States Power Company. The apparatus committee, which will close the session, has two papers scheduled, "Telephone Interference Caused by Residual Currents from Y-point to Ground Connection on Generator", and "Specifications for Transformer Oils and Recovery of Old Oils", the latter by W. A. Struthers, Portland Electric Power Company.

Leading in the afternoon session, the underground systems committee will present three progress reports on studies being undertaken this year as follows: "Overhead Lead-Covered Cable", "Fitting of Lead Sheaths on Cables," and "Transformer Manhole Ventilation", which will be followed by a paper on "Modern Submarine Cable Practice." The prime movers committee has scheduled the following: "Present Practice in Design and Operation of Hog-Fuel Plants", by Tom Perry, superintendent of stations, Northwestern Electric Company; "Economics of Diesel Engine Drives as Compared with Electric Drive", by R. S. Carroll, assistant engineer, Portland Electric Power Company; and "Heat Balance Control by Stage Bleeding and its Effect on Caustic Embrittlement of Boilers", by H. S. Bastian, of Charles C. Moore & Company, Portland. The inductive co-ordination committee, which closes the session, has not yet announced its program. Saturday, March 12, can be utilized for inspection trips to points of interest by those so desiring.

Beside arranging the program for the general meeting, the executive committee heard reports from all committees on the progress of this year's work and discussed the continuance of that work for the remainder of the association year. Considerable discussion took place on the contemplated revision of General Order No. 10, an Idaho statute which codifies electrical practice in that state, and also on service rules covering interior services and wiring proposed for the state of Washington.

The committee appointed the following to represent the Northwest Geographic Division at the group meeting of the committee of the Engineering National Section to be held in New York, Feb. 2-5, 1927: H. H. Schoolfield, chief engineer, Pacific Power & Light Company, Portland; E. F. Pearson, electrical engineer, Northwestern Electric Company, and D. W. Proebstel.

* The Proebstograph is a device invented by Mr. Proebstel, by which a quick and simple determination can be made of the over-break in tunnels and of the amount of concrete needed for the lining.

O. L. Le Fever New Chairman of Engineering Section

O. L. LeFever, general superintendent, Northwestern Electric Company, Portland, recently was appointed chairman of the Engineering Section, Northwest Electric Light and Power Association, to succeed F. J. Rankin, formerly chief engineer, Idaho Power Company, Boise, who resigned to take a position with the Electric Bond & Share Company, New York. Mr. Le Fever has been active in the affairs of the Northwest association for many years, holding committee positions and chairmanships in the Technical Section, the more recent of these being the chairmanship of the hydraulic power committee.

Mr. Le Fever was born in Hampton, Iowa, in 1880, and attended both the

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University of Minnesota and the Iowa State College, receiving the degree of electrical engineer at the latter in 1906. Previous to and during his college course he had two years' experience in power-plant operation with the Minneapolis General Electric Company. After graduation he entered the engineering department of the Northwestern Bell Telephone Company, Minneapolis, and shortly after was transferred to the installation department of the Western Electric Company, where he remained until 1909. He then spent about a year on installation and test work for the Westinghouse Electric & Manufacturing Company at its factory at East Pittsburgh, Pa. He left this work to install train lighting and generating equipment for the Northern Pacific Railway Company in St. Paul, and after completing certain installations he was retained in the employ of that company as traveling electrical inspector.

This brought him to the Pacific Coast where, in 1910, he went to work for W. S. Barstow & Company, who had the contract for installing the underground system for the Portland Railway, Light & Power Company, Portland, predecessor of the Portland Electric Power Company. On the completion of this job he was retained in the engineering department of that company and later joined the engineering staff of the Pacific Power & Light Company, Portland. In 1913, when the Northwestern Electric Company began operations in Portland, he was retained by it as superintendent of underground construction, remaining in that position until he was made electrical engineer in 1917. In 1923 his responsibility was increased and the scope of his duties was expanded under the title of general superintendent, combining the duties of chief engineer.

College Classes to Hear Talks on Utility Business

Pursuing further the practice started last year, the Public Relations Section committee on co-operation with educational institutions, with R. B. Bragg, district manager, Pacific Power & Light Company, Walla Walla, Wash., as chairman, has arranged for talks on a number of subjects pertinent to the public utility business to be delivered by utility men before classes at Washington State College, Pullman, Wash., and the University of Idaho, Moscow, Idaho.

These subjects are as follows: "General Economics of the Public Utility Business," "Indeterminate Permits in Lieu of Fixed Term Franchises," "Phases of Government Regulation as Applied to the Public Utility," "Engineering Phases of Public Utility Operation," "Control of Migratory Fish," "Public Utility Valuation and Rate-Making," "History and Development of the Electrical Industry," "Rates," "History of Electrical Service," "Regulation of Public Utilities," "Present Electrical Development in the United States in Its Relation to Public Welfare," and "Rate Making of Public Utilities."

Each of these subjects is prepared by a different official of one of the Northwest utility companies, and all have been made available for presentation at the institutions mentioned on due notice being given through the committee.

In addition, the committee is taking steps to interest certain universities in the territory that now do not give regular courses in the economies of public utilities to install such courses.

A. I. E. E.

Pacific Coast convention of the Institute for 1927 will be held at Del Monte, Calif., in September, according to the announced plans of the San Francisco Section which is charged with arrangements for the occasion. Definite dates will be announced later. A program of exceptional quality is being planned.

Vote on California Water and Power Act for Years 1922, 1924 and 1926

For the purposes of comparison the following table has been compiled, showing the official vote by counties for and against the California Water and Power Act for the years 1922, 1924, and 1926, with the ratio of defeat:

	1922			1924			1926		
	Yes	No	Ratio	Yes	No	Ratio	Yes	No	Ratio
Alameda	26,332	60,903	2.2	36,251	76,746	2.12	27,782	68,578	2.48
Alpine	6	42	7.0	5	32	6.40	5	33	6.60
Amador	455	1,536	3.36	476	1,280	2.69	324	971	3.0
Butte	2,414	6,114	2.58	3,864	5,504	1.42	2,513	5,204	2.07
Calaveras	681	1,430	2.1	658	1,306	1.98	467	936	2.0
Colusa	550	2,196	4.0	571	1,780	3.09	506	1,736	3.43
Contra Costa	4,001	9,693	2.42	4,701	9,552	2.03	3,876	8,620	2.22
Del Norte	116	486	4.2	207	363	1.75	185	482	2.63
El Dorado	857	1,489	1.74	1,079	1,361	1.26	678	1,508	2.22
Fresno	8,669	21,108	2.44	10,696	20,279	1.92	9,676	19,156	1.98
Glenn	973	2,688	2.77	1,097	1,963	1.79	772	2,080	2.70
Humboldt	1,830	6,712	3.67	2,646	7,574	2.87	2,576	6,138	2.38
Imperial	1,729	3,361	1.94	1,699	2,988	1.76	1,719	3,118	1.75
Inyo	824	1,429	1.73	453	1,077	2.38	426	1,218	2.86
Kern	4,731	11,217	2.37	4,495	10,953	2.44	3,864	11,085	2.87
Kings	662	4,782	7.2	984	3,824	3.90	822	3,650	4.45
Lake	520	977	1.88	455	1,201	2.64	449	1,558	3.47
Lassen	435	1,428	3.28	661	1,180	1.78	560	1,725	3.08
Los Angeles	50,022	160,330	3.21	90,611	285,527	3.15	79,250	237,883	3.0
Madera	1,391	2,073	1.49	1,210	1,684	1.21	1,281	2,132	1.66
Marin	2,299	5,849	2.54	2,811	6,734	2.40	2,066	5,337	2.58
Mariposa	219	657	3.0	219	334	1.52	173	507	2.93
Mendocino	813	4,321	5.52	1,018	3,771	3.70	856	3,813	4.45
Merced	1,552	3,915	2.52	1,733	3,825	2.21	1,339	3,970	2.98
Modoc	120	1,390	11.6	233	962	4.13	156	1,029	6.6
Mono	83	180	2.17	66	129	1.95	53	134	2.53
Monterey	1,483	4,973	3.36	1,457	4,933	3.38	1,235	5,789	4.68
Napa	1,295	4,592	3.54	1,444	4,250	2.94	1,119	4,712	4.21
Nevada	961	2,158	2.25	1,070	2,283	2.13	856	1,678	1.96
Orange	2,902	14,798	5.13	5,069	19,119	3.77	3,441	18,623	5.57
Placer	2,140	2,997	1.4	2,518	2,994	1.19	2,008	2,809	1.4
Plumas	517	680	1.63	588	583	—1.01	410	760	1.85
Riverside	2,960	9,363	3.16	2,952	10,156	3.44	1,877	9,862	5.26
Sacramento	11,924	13,233	1.11	14,907	13,480	—1.11	10,643	12,367	1.15
San Benito	688	1,846	2.68	563	1,364	2.42	405	1,626	4.01
San Bernardino	3,985	13,909	3.49	5,029	18,295	3.66	3,258	16,381	5.02
San Diego	10,232	20,047	1.95	14,439	22,729	1.57	10,942	22,021	2.02
San Francisco	42,737	74,996	1.75	49,093	76,604	1.56	32,233	64,607	2.01
San Joaquin	5,390	12,977	2.4	5,841	13,981	2.40	4,378	14,535	3.32
San Luis Obispo	1,464	4,647	3.17	1,636	4,825	3.95	1,426	4,725	3.36
San Mateo	3,319	7,233	2.18	4,242	8,397	1.98	3,771	7,839	2.08
Santa Barbara	1,598	6,959	4.36	2,317	8,846	3.82	1,592	6,421	4.03
Santa Clara	7,281	18,243	2.5	10,194	21,151	2.08	7,113	20,786	2.92
Santa Cruz	1,850	5,703	3.08	2,043	4,873	2.38	1,700	6,006	3.53
Shasta	1,287	3,333	2.59	1,326	3,031	2.28	1,132	2,255	1.99
Sierra	136	365	2.68	215	329	1.53	190	314	1.65
Siskiyou	2,021	2,907	1.45	1,813	3,171	1.75	1,474	2,966	2.01
Solano	3,234	6,303	1.95	3,476	5,284	1.52	2,783	5,240	1.88
Sonoma	2,685	11,299	4.2	3,340	12,039	3.61	3,175	11,575	3.65
Stanislaus	4,444	7,352	1.65	3,224	8,976	2.78	2,785	8,030	2.88
Sutter	747	1,867	2.5	1,018	1,937	1.90	875	2,036	2.32
Tehama	1,357	2,296	1.69	1,358	2,462	1.78	1,064	2,771	2.6
Trinity	231	690	2.99	226	626	2.77	190	513	2.7
Tulare	3,787	12,515	3.31	5,028	11,350	2.26	4,610	10,011	2.17
Tuolumne	1,160	1,666	1.43	1,089	1,601	1.47	629	1,329	2.11
Ventura	1,660	5,901	3.56	1,308	6,173	4.72	1,057	5,341	5.05
Yolo	1,546	3,249	2.1	1,526	3,167	1.95	1,263	2,739	2.16
Yuba	986	2,060	2.09	1,139	2,182	1.92	1,011	1,785	1.76
Total	243,604	597,453	2.45	320,383	751,985	2.35	253,019	671,053	2.63

News Briefs

Journal of Electricity Index Ready Feb. 15.—An index to the Journal of Electricity covering the numbers issued from July 1 to Dec. 15, 1926, inclusive, now is in preparation and will be ready for distribution about Feb. 15. Copies may be obtained upon request at the office of Electrical West, formerly the Journal of Electricity, 883 Mission Street, San Francisco.

To Install Lighting Standards.—The Northwestern Electric & Power Company, Orchards, Wash., has signed contract with the city commission for the installation of light standards on the two main streets of the city.

Utah Town Considers Enlargement of Plant.—The town of Ephraim, Utah, is contemplating the enlargement of its municipal electric plant.

Electric Industrial Truck and Tractor Shipments.—December shipments of electric industrial trucks and tractors, as reported to the Department of Commerce by the nine leading manufacturers in the industry, were 118 as compared with 123 in November and 107 in December, 1925. Shipments for the entire year amounted to 1,415 in 1926 as compared with 1,440 in 1925. In 1925 shipments consisted of 192 tractors, 1,120 of all other types and 128 export; in 1926 190 tractors and 1,127 of other types were shipped within the country and 98 exported.

Mountain States Utility Plans Big Development Program.—Officials of the Mountain States Telephone and Telegraph Company, Denver, have outlined a development program involving the expenditure of more than $38,000,000 in the Mountain states territory during the next five years. Plans include new buildings, new long-distance switchboards and associated equipment, station equipment, exchange and toll lines. More than $18,000,000 is expected to be spent in the state of Colorado.

Power Project Planned on Nisqually River.—Application has been filed with the state supervisor of hydraulics, Olympia, Wash., by Lars Langloe of that city for permission to appropriate 1,050 sec.-ft. of water from the Nisqually River. According to the plans outlined, the water will be used for the generation of 25,000 continuous electric horsepower at a power plant situated at a point 4 miles west of the town of Yelm. No impounding reservoir will be required as the water will be fed directly into the turbines from a 10-mile canal and then returned to the river.

Electric Railway Applies for Permit to Increase Rates.—Pacific Electric Railway Company has applied to the California Railroad Commission to increase its passenger rates and fares throughout its system in southern California, alleging that its present rates are inadequate to provide a fair return upon its investment in its property. Applicant alleges that the valuation of its interurban and local railway lines and motor coach and bus lines is in excess of $85,000,000, and that its operating income for the first nine months of 1926 was $495,318.40 less than that for the first nine months of 1925.

Industrial Power Rates Reduced.—As a result of an investigation made by the engineering department of the California Railroad Commission in cooperation with the engineers of the Coast Counties Gas & Electric Company, Santa Cruz, new rates for industrial power service became effective Jan. 10, 1927, in the territory served by that company. The localities affected are Santa Cruz, Watsonville, Gilroy and Hollister. This reduction, which averages between 5 and 10 per cent, is attributed largely to the growth in the industrial development of these cities during the last three years.

Dixie Power Company to Build New Station on Santa Clara River in Utah.—Permission has been granted by the Public Utilities Commission of Utah to the Dixie Power Company of Cedar City and St. George, Utah, to construct another hydroelectric generating station on the Santa Clara River in Washington County. The approximate cost of the new plant is estimated at $175,000. The capacity of the new generating station will be 800 kva. and it is expected to be placed in operation not later than May 1, 1927. It will be constructed below the present No. 2 station of the company on the Santa Clara River.

Colorado Springs Considers Purchase of New Street-Lighting Units.—Upon the recommendation of the city electrician of Colorado Springs, Colo., the city council is considering the purchase of new street lighting units to cost approximately $54,000. The installation, if approved by the council, will start early next year, according to A. M. Wilson, city manager.

Contractors, Dealers and Inspectors

Code Standardization Lively Topic at Northwest Inspectors Convention

Recording a substantial measure of accomplishment during the past year and indicating an earnest attitude toward a continuance of the good work undertaken, the second convention of the Northwest Association of Electrical Inspectors, Jan. 17-18, Portland, passed into history marking the first anniversary of the formation of this organization. Unanimity of opinion on major matters such as code standardization and the sponsorship of certain needed legislation in Oregon and Washington was spiced with a healthy disagreement on some of the minor details of the matters discussed, so that the interest of the 105 delegates present was sustained beyond the adjournment of the deliberative sessions in the late afternoon of the second day and hung over until after the banquet that evening. The association enjoyed a growth in membership during the year from 119 to 172, as was reported by F. D. Weber, electrical engineer, Oregon Insurance Rating Bureau, Portland, secretary.

The keynote of the convention was sounded early in the first session in the report of the president, L. W. Going, chief electrical inspector, Portland, who pointed out the need for amplification of the present national code by special codes of municipalities, but urging that through co-operation with other similar organizations the necessary changes in the national code might be made so that that code would be adequate to the needs of administrators. This keynote was further taken up by W. J. Canada, electrical field secretary, National Fire Protection Association, in his paper, "One Code—or Babel," and the discussion which followed helped crystalize opinion, culminating in a resolution passed during the last session. This resolution, formulated in a joint meeting of the executive committee and committee on standards and standardization, and introduced as a special report of the executive committee, recommended to the electrical committee of the National Board of Fire Underwriters amplification of the national code in the following four particulars: that the national code define the places where conduit or other specific approved types of wiring shall be employed to safeguard life and property; determine the number of circuits per unit area required to meet the demands for reasonable intensity of illumination and capacity for appliances, in order to avoid future overloading of such circuits and subsequent unsafe fusing; determine the sizes of mains and feeders giving proper consideration to the diversity of loads; and formulate adequate motor wiring tables and protective methods for industrial and other power installations.

Among accomplishments of committees in their work during the year reported to the convention and ratified by that body, those pertaining to the drafting of three pieces of legislation for Oregon and Washington were important. F. H. Murphy, illuminating engineer, Portland Electric Power Company, Portland, chairman of the committee on legislation, reported on a bill drafted by his committee to consolidate all electrical inspection in Oregon under a department of the Bureau of Labor. I. B. Sturges, deputy electrical inspector, Portland, read a bill prepared by his committee to regulate the installation of radio aerials in Oregon with the intent to eliminate the hazard involved in attaching them to power line poles. These bills were pursuant to action taken by last year's convention. H. A. Patton, electrical engineer, Washington Surveying and Rating Bureau, Seattle, reported on the drafting of a state electrical code for Washington. These measures are all to be proposed in the current sessions of the legislatures involved.

Other committee accomplishments were noted in the report of the committee on standards and standardization by its chairman, E. G. S. Pryor, resident engineer, Underwriters' Laboratories, Inc., Seattle. The committee had given consideration to and issued findings on a number of questions raised at last year's convention and on new questions arising during the year, a resumé of which will be published in a future issue of Electrical West.

At the opening of the first session Monday morning the convention was welcomed on behalf of the city by A. L. Barbur, city commissioner, and on behalf of the electrical industry of Portland by O. B. Coldwell, vice-president and general manager, Portland Electric Power Company. Responding for the association, J. B. Fisken, consulting engineer, The Washington Water Power Company, Spokane, in reminiscent mood, recalled the first electric code, which was prepared by George P. Low of San Francisco, founder of the Journal of Electricity, saying that the Low code antidated the first edition of the National Electric Code, which was issued in 1897, and was, in fact the basis for the national code. The balance of the morning session was taken up with roll call, reports of the officers, and the appointment of committees.

How the Code Is Made

Urging the desirability of having one adequate national code in place of a multitude of separate codes for different localities, W. J. Canada opened the afternoon session with his paper already referred to. He bespoke the co-operation of the Northwest association with other associations of its kind in bringing to the attention of the national electrical committee the consensus of its opinion on inspection needs. He showed how he, himself, could be used as an "informal agency" in bringing before the proper bodies the desires of the association, and in the long discussion which followed his paper he was called on to answer many questions about the machinery of code making and how to make contact with the national committee. A better understanding of the place occupied in the picture by the sectional inspectors' associations, and a virtual pledge of co-operation as expressed in the resolution already referred to was the outgrowth of this discussion.

In a paper picturing the interrelation of the power company, the contractor, the inspector and the consumer, T. W. Swartz, engineer, underground department, Northwestern Electric Company, Portland, explained the viewpoint of each in the problem of making electric safety available. The paper was jointly prepared with G. A. Drewett of the same company. After reading the paper, Mr. Swartz showed charts illustrating the development in underground distribution practice in Portland, which showed how practices of long standing affected interpretation of the code. Discussion developed some difference of opinion as to the desirability of arrangement of switches and meters in some of the distribution centers portrayed, but it was explained that constant supervision and frequent inspection of such installations by the power company, which was vitally interested in their proper operation, made such practices permissible.

Electric Range Diversity Discussed

A series of charts showing the demand curve of a number of ranges in service in apartment houses was the essence of a paper on diversity of range loads presented by R. E. Thatcher, superintendent of service, central district, Puget Sound Power & Light Company, Seattle. In these charts it was shown that the ratio of the connected load of a group of ranges to the maximum demand of that group was as high as six to one, and that the peak generally lasted for not longer than ten to fifteen minutes. The point emphasized was that codes should recognize this diversity and provide adequate concessions in specifying the size installation in mains, feeders and switches. The subject was deemed to be of such importance that a special committee was appointed to study the subject and recommend certain standards.

The Tuesday morning session opened with a discussion of the electrical hazards in the grain and milling industry, presented by N. J. Sankela, Mutual Fire Insurance Company, Seattle. Due to the prevalence of grain dust, highly ex-

plosive under certain conditions, it is necessary to guard against open flame, sparks or high heat. He discussed at length conditions under which electric lamps or the wiring supplying them might cause such explosions, citing as the commonest of such conditions, that in which the lamp, becoming coated with dust, heats to a higher temperature than normal. Motor burnouts due to insulation break-down and burnouts due to bearing trouble were said to be the principal causes of mill fires traced to motors, and the most satisfactory ways of avoiding such fires were, first, to enclose motors in dust-proof, flash-proof enclosures, second, to inspect frequently, and third, to keep windings free from dust accumulations. In the general discussion he was asked many questions about the detail of preventive measures advocated.

C. W. Lynch, city fire alarm system, Seattle, discussed fire alarm protection for hotels and rooming houses, specifying the types of buildings which were justified in installing the pre-signal system, where the first alarm quietly notifies various hotel employees, who, on such alarm, investigate before turning in the general alarm to arouse the guests. Such a system is proper, he said, only in the most modern type of fire proof construction which would not permit a fire to spread rapidly, whereas in buildings of ordinary construction the system used should be one which sounded the general alarm immediately, "taking the chance of a slight panic following an unnecessary alarm, rather than the chance of the fire spreading as the result of the somewhat delayed alarm as is inevitable in the pre-signal system." Lively discussion of several kinds of fire alarm signals, following presentation of the formal paper, led to the formation of a special committee to investigate and report back to the convention next year on some standard to govern safe practice.

In the absence of L. D. Beach, chief electrical engineer, Long Bell Lumber Company, Longview, Wash., his paper describing the electrical transmission and distribution system in the mills of his company was read by F. D. Weber. Because of the minute detail of the material presented and the fact that Mr. Beach was not present to answer questions, discussion was limited and it was suggested that members could study the paper in more leisure after its publication in the proceedings.

Replete with examples of difficulties encountered by the inspector of industrial plants in administering the code was the paper of W. E. Roberts, electrical inspector, Portland, which closed the morning session. Particular stress was laid on the point that inspectors should evidence a desire to co-operate with the plant owner in correcting discrepancies, showing good cause based on elimination of fire and personal hazard or avoidance of shut-downs, rather than ordering changes arbitrarily because the code says so. The commonest difficulty encountered, that of the inadequacy of fuses to carry their rated capacity over long periods of operation, was taken up at length in the general discussion. It was pointed out that tests on fuses were made under more or less ideal conditions and that the wear and tear on switches and fuse clips in actual service was one of the main causes for the failure of fuses, and that good practice sanctioned a slight over-switching and over-fusing of circuits as being the lesser of the evils arising from this difficulty.

Bombshell in "Sub-standard Appliances"

Something in the nature of a bombshell was dropped into the opening of the afternoon session by the vigorous presentation by J. C. Caine, electrical inspector, Portland, of the attempts and success of the inspection department of that city in keeping sub-standard electrical appliances out of the local market. In the course of his remarks he laid at the door of the National Board of Fire Underwriters and the Underwriters' Laboratories, Inc., responsibility for the fact that so many manufacturers were able to produce sub-standard equipment and stay in business, charging those organizations with assuming an indifferent, "buck-passing" attitude in this respect. This presentation inspired spirited discussion and brought to their feet many defenders of the organizations thus arraigned, which helped to clarify for many delegates the position they occupied in the inspection picture from a national standpoint. Consensus of opinion eventually developed that the municipal inspector, through his more potent control backed by police power, represented the agency best able to regulate the situation.

At this session the floor was given to visitors not on the regular program, among whom was W. A. Grose, state fire marshal of Washington, Olympia, who applauded the work of the association and urged close co-operation with other fire protection agencies. "Fire chiefs used to be judged by the number of large fires their departments were called upon to put out; now they are judged by the few fires that occur in their territories," he said in explaining the changed attitude of the public toward fire prevention activities.

New Officers Named

The balance of the session was devoted to consideration of committee reports, some of which are referred to above, and to administrative details. New officers elected were: president—H. S. Jenkins, chief electrical inspector, Bellingham, Wash.; vice-president—T. W. Carlon, electrical inspector and fire chief, Bend, Ore.; and secretary—F. D. Weber, who was re-elected. J. H. Sroufe, of Jaggar-Sroufe, contractors, Portland; J. B. Fisken and H. A. Patton were re-elected to the executive commitee, and A. Nicholson, chief electrical inspector, Seattle, was elected to fill the vacant seat in this commttee. Honorary members elected were, W. J. Canada, New York; R. J. Larrabee, San Francisco; B. C. Hill, Oakland, and R. H. Manahan, Los Angeles. Mr. Hill and Mr. Manahan are president and vice-president, respectively, of the California Association of Electrical Inspectors, and officially represented that association at the convention. The articles of association were amended to include members from Idaho, Montana and British Columbia, new members from Victoria and Vancouver being present at this meeting.

The convention heard invitations from Victoria, B. C., and Seattle, to hold the next convention in those cities, and also an invitation to send delegates to a meeting next month in New York at which the organization of the International Association of Electrical Inspectors will be considered. After a debate, both matters were turned over to the executive committee with power to act. Among the resolutions passed were three expressing the gratitude of the association for assistance in the publication of last year's proceedings to the following: C. W. Mitchell, secretary, California Association of Electrical Inspectors, San Francisco; Harry B. Kirkland, Society for Electrical Development, New York; and W. J. Canada.

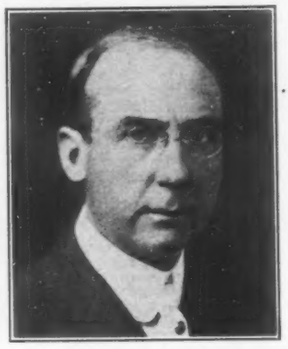
A much appreciated innovation at this year's convention was the manufacturers' exhibit installed in a room adjoining the convention hall. It is expected that this feature will be continued and expanded at future meetings to amplify its three-fold purpose—to enable manufacturers to show new equipment to a concentrated group which influences purchasing, to furnish delegates with an opportunity of learning about such equipment, and to help defray the expenses of the convention.

At the banquet, Tuesday evening, at which L. T. Merwin, vice-president and general manager, Northwestern Electric Company, was toastmaster, a number of entertaining talks were heard. Among those that touched on serious matters were A. C. McMicken, general sales manager, Portland Electric Power Company, who brought out some of the effects of the code on commercial departments; J. R. Tomlinson, contractor, Portland, who told something of the Association of Electragists International; and John A. Laing, vice-president and general attorney, Northwestern Electric Company and Pacific Power & Light Company, Portland, who discussed inspection from the standpoint of the public. The feature of the entertainment for the ladies was a tea at the home of Mrs. F. D. Weber, wife of the association secretary.

Convention of the Northwest Association of Electrical Inspectors, Portland, Ore., Jan. 17-18.

Personals

Samuel M. Kennedy, vice-president of the Southern California Edison Company, Los Angeles, in charge of business development and public relations, has announced his retirement from active service. Mr. Kennedy has been connected with the company for more than twenty years, having entered the organization in 1903 when the United Electric, Gas & Power Company was absorbed by the Edison company. For two years prior to that he had been connected with the former company as assistant to the president. On the Pacific Coast Mr. Kennedy has been a recognized leader in public relations



SAMUEL M. KENNEDY

work. Much of his success in that work has been due to the fact that he has adopted the Golden Rule as a fundamental principle of business and always has advocated and practiced courtesy and consideration in his dealings with the public, combined with intelligent effort to deal fairly and understandingly with the individuals that go to make up that public. His writings on the subject of public relations have been widely circulated, his essay, "The Man on the Street", and his book, "Winning the Public", being among the best known. He always has taken an active part in any movement looking toward the betterment of conditions in the industry. Mr. Kennedy was born in Canada. After receiving his education there, he entered his father's business of importing, where he remained for ten years. His health failing, he spent five years in travel and then settled down in California and took up his work in the electrical industry. About a year ago Mr. Kennedy was the victim of an accident which has resulted in his being physically incapacitated since that time.

Paul H. Affolter, of the Garland Affolter Engineering Corporation, San Francisco, has been spending the greater part of January in New York on business. He is expected to return about Feb. 1.

R. N. Vaughn, engineer with the California Railroad Commission for the last twelve years, and valuation engineer for the last six years, has resigned that position to become associated with the H. M. Byllesby Company of Chicago.

A. D. Cameron, manager of street lighting sales, central station department, General Electric Company, Schenectady, N. Y., recently spent some time in San Francisco.

Frederick M. Feiker, for the past three years operating vice-president of The Society for Electrical Development, Inc., New York, has been made managing director of the Associated Business Papers, a position newly created by the executive committee. Through past experience and training Mr. Feiker is particularly well fitted for this post. He served his journalistic apprenticeship with the General Electric Company writing for trade and industrial papers. Later he joined the A. W. Shaw Company and established the magazine, Factory, later becoming chaiman of the editorial board for System and Factory. During that time he helped organize the industrial courses in the Harvard Graduate School of Business and lectured there. In 1915 he entered the organization of the McGraw Publishing Company as editor of Electrical World and guided the early development of Electrical Merchandising, becoming eventually vice-president and editorial director of the McGraw-Hill Company. In 1921 Mr. Feiker was invited by Herbert Hoover to join him in Washington as assistant to the Secretary of Commerce to aid him personally in carrying out plans for the reorganization of the Department of Commerce in its relations with trade and industry. Mr. Feiker, on leave of absence from the McGraw-Hill Company, spent eighteen months in government work. In 1923 he became vice-president of The Society for Elec-

FREDERICK M. FEIKER

trical Development, Inc., and has specialized in organizing competitive commodity promotion campaigns for groups of manufacturers. Mr. Feiker holds the title of "expert consultant" to the U. S. Department of Commerce, and is vice-chairman of the advisory committee on distribution statistics.

Henry L. Senger has been made chief engineer of the Idaho Power Company, Boise, succeeding **F. J. Rankin,** who recently resigned to join the organization of the Phoenix Utility Company,

HENRY L. SENGER

New York. Mr. Senger was born in Wisconsin and received his early education in Nebraska. After his graduation from the University of Nebraska in 1903 in electrical engineering he spent a short time as levelman on the survey of an electric railway in Pontiac, Ill., and then went to Chicago where he joined the Arnold Company, at that time one of the leading engineering firms of the country. He continued in its employ for nine years. During the early part of that period he was engaged in survey work in Missouri, southern Kansas and Indian Territory. In 1905 he was made assistant engineer on construction of the hydroelectric development on the Spring River at Lowell, Kan., and later was transferred to Pittsburg, Kan., as assistant engineer for the Arnold Company on the construction of the Kansas City Southern Railway's shops. In the fall of 1906 Mr. Senger went to Springfield, Mo., representing the Arnold Company, in charge of construction of railway shops for the St. Louis-San Francisco Railroad. The following year he spent in Chicago collecting valuation data on track and road bed of the South Chicago Street Railways. From 1908 until 1912 he served as resident engineer for the Arnold Company on the Oxbow development near Copperfield, Ore. At the end of that period he went to Boise as engineer in charge of surveys of the city lines and the Hillcrest line for the Idaho Railway, Light & Power Company, a predecessor of the Idaho Power Company.

A. A. Shuler, district agent at Chelan, Wash., for The Washington Water Power Company, Spokane, was adjudged the winner of the employees' vacation story-picture contest conducted by that company during the summer.

C. W. Matheson, for the last two years vice-president and director of sales of the Oakland-Pontiac division of General Motors Corporation, has been made vice-president of Kelvinator, Inc., and director of Kelvinator sales.

Ely C. Hutchinson, since 1922 vice-president and general manager of The Pelton Water Wheel Company, San Francisco, has been appointed president and general manager of that organiza-

ELY C. HUTCHINSON

tion. This change in executive responsibility comes as a distinct recognition of Mr. Hutchinson's ability, culminating a period of rapid advancement through the positions of sales engineer, sales manager, manager of engineering and sales, chief engineer and vice-president. In 1908 he became associated with The Pelton Water Wheel Company as sales engineer. Since that time he has made an intimate study of hydraulic power requirements peculiar to the Pacific Coast and has secured patent recognition of several design features now used in hydraulic turbine construction. Mr. Hutchinson is a member of the Bohemian Club, Commonwealth Club, Engineers Club, Mechanics Institute, San Francisco Electrical Development League, American Society Mechanical Engineers, American Society Civil Engineers, Pacific Coast Electrical Association, Army Ordnance Association, and Mount Diablo Country Club, to mention only a few of his many affiliations. He has served as president of the San Francisco Engineers Club and as chairman of various national and local committees of the American Society of Mechanical Engineers and American Society of Civil Engineers. At present he is chairman of the newly formed hydraulic division of the American Society of Mechanical Engineers and Pacific Coast representative of its power test code committee. Mr. Hutchinson is also one of the advisors on prime movers for the United States national committee of the International Electro-Technical Commission.

G. F. Redman, formerly general line foreman for the Idaho Power Company, has returned to that company's employ as general construction foreman in charge of the building of the new 132-kv. line from American Falls to Shoshone Falls.

C. L. Burgess, formerly district advertising manager for the Westinghouse Electric & Manufacturing Company, Los Angeles, has resigned to enter the building, financing and real estate business at Brentwood, Calif.

A. E. Provost, an electrical engineer formerly connected with the M. B. Austin Company, Chicago, has been added to the sales force of J. G. Pomeroy & Company, San Francisco and Los Angeles, as conduit specialist.

E. S. Jenison, vice-president and manager, Smith-Booth-Usher Company, San Francisco, has been making an extended trip through the East. While away he attended the Road Show in Chicago.

R. S. Daniels, assistant engineer, **S. M. Bullis,** safety director, and **J. F. Partridge,** assistant engineer, respectively, California Oregon Power Company, Medford, Ore., attended the meetings of the Engineering Section, P.C.E.A., in San Francisco, Jan. 12-14. Mr. Daniels also spent additional time in California visiting power systems.

George W. Barker, formerly of Allied Industries, Inc., San Francisco, has joined the Sandoval Sales Company as sales manager.

W. R. Bell, general superintendent of light and power, El Paso Electric Company, El Paso, has been elected first vice-president of the local Kiwanis Club.

Charles M. Brown, sales manager of Woodrow Manufacturing Company, Newton, Iowa, has been making a survey of the Pacific Coast states. He has established temporary headquarters in Los Angeles.

Lionel J. Bourke, since Dec. 1, 1924, secretary to William H. McGrath, vice-president, Puget Sound Power & Light Company, Seattle, has been appointed assistant to the vice-president. Mr. Bourke was born in Yoakum, Texas, in 1900, and is an alumnus of the Texas Agricultural and Mechanical College, from which he was graduated in 1922 with the degree of B.S. in electrical engineering. In July of that year he entered the employ of Stone & Webster, Inc., Boston, and in March of the fol-

LIONEL J. BOURKE

lowing year joined the Puget Sound Power & Light Company, Seattle, as a student engineer. A year later he became resident manager for the company at Elma, Wash., and on Dec. 1, 1924, he was appointed secretary to Mr. McGrath in the executive offices in Seattle.

Obituary

R. J. Davis, for a number of years San Francisco district sales agent for the Century Electric Company, St. Louis, died in San Francisco Jan. 9. He was 65 years old. A native of New York, Mr. Davis went to San Francisco in 1882 where he became connected with the Pacific Bank and later with the San Francisco Gas & Electric Company, predecessor of the Pacific Gas and Electric Company. He left that company to enter into business as representative of Eastern electrical manufacturers and after having been engaged in that venture for some time became district sales

R. J. DAVIS

agent for the Century Electric Company. At one time in his career Mr. Davis was interested in the Journal of Electricity, now Electrical West, and served as a member of its board of directors from 1906 until 1919, when it was acquired by the McGraw-Hill Publishing Company.

Charles Waite Waller, who served as assistant general manager of the Great Western Power Company, San Francisco, in 1907, died in New York City Jan. 19, 1927.

William H. Hodgins, secretary of The Okonite Company, died after a brief illness Jan. 7 at his home in Glen Ridge, N. J. Mr. Hodgins had been associated with The Okonite Company for more than forty years, and served for many years as a director in addition to being secretary.

Dr. R. M. Powers, one of the incorporators of the original San Diego Gas Company, a predecessor of the San Diego Consolidated Gas & Electric Company, and actively engaged in the central station business until 1905, died in San Diego, Calif., Jan. 14, 1927, at the age of 81. Shortly after its incorporation the gas company merged with an electric light company, and in 1887 Dr. Powers became manager. He held that position until 1905 when he sold his interest to the present operators.

K. Kambe, president of the Tokyo Electric Light Company, the largest corporation in Japan, died recently.

Meetings

Coming Events

California Association of Electrical Inspectors.—Annual convention at Hotel Leamington, Oakland, Calif., March 24-26, 1927.

California Electragists, Northern Division.—Annual boat ride. Meeting in Hotel Senator, Sacramento, Calif., Feb. 17-18, 1927.

Pacific Coast Electrical Association—Commercial Section, Spring meeting in Chamber of Commerce Building, Los Angeles, Calif., March 9-10, 1927.

Advertising and Publicity Section. Meeting at Palace Hotel, San Francisco, Feb. 25, 1927.

Annual Convention, Casa del Rey, Santa Cruz, Calif., June 14-18, 1927.

Engineering Section. Meeting in San Joaquin Light & Power Corporation's Building, Fresno, Calif., April 6-8, 1927.

Purchasing and Stores Section. Group Meeting in San Diego Consolidated Gas & Electric Corporation Building, San Diego, Calif., Feb. 17-18, 1927.

Transportation Section. Meeting in San Joaquin Light & Power Corporation's Building, Fresno, Calif., Feb. 17-18, 1927.

National Electric Light Association—Annual Convention, Atlantic City, N. J., June 4-10, 1927.

Commercial National Section. Second Group Meeting. Edgewater Beach Hotel, Chicago, March 8-11, 1927.

Northwest Electric Light and Power Association—Commercial Section. Multnomah Hotel, Portland, Ore., Feb. 7-8, 1927.

Annual Convention, Salt Lake City, Utah, June 21-24, 1927.

Fourth general meeting of Engineering Section, Portland, Ore., March 10-11, 1927.

Utah Electrical League Elects Officers for Coming Year

The Electrical League of Utah, formerly the Rocky Mountain Electrical Cooperative League, elected new officers and a new board of trustees at its recent annual meeting. Those elected were: B. E. Rowley, manager, Edison Electric Appliance Company's Salt Lake City branch, president; R. M. Bleak, superintendent of lighting and appliance sales, Utah Power & Light Company, vice-president; Miles R. Cahoon, Jr., Mountain States Telephone & Telegraph Company, secretary-treasurer.

The board of trustees is made up as follows:

Manufacturers Division

B. E. Rowley, Edison Electric Appliance Company.
W. A. Moser, Westinghouse Electric & Manufacturing Company.
B. C. J. Wheatlake, General Electric Company.
Thad J. Stevens, Stevens Sales Company.

Central Station

D. C. Green, Utah Power & Light Company.
P. M. Parry, Utah Power & Light Company.
H. M. Ferguson, Utah Power & Light Company.
R. M. Bleak, Utah Power & Light Company.

Telephone Division

Miles R. Cahoon, Jr., Mountain States Telephone & Telegraph Company.

Contractor-Dealer Division

Fred C. Wolters, Modern Electric Company.
Geo. R. Randall, Salt Lake Electric Supply Co.
G. J. Guiver, E. G. Holding Electrical Company.
G. W. Forsberg, Wasatch Electric Company.

Jobbers Division

J. A. Kahn, Capital Electric Company.
W. J. Berryman, Mine & Smelter Supply Company.
H. R. Bygel, United Electric Supply Company.
C. B. Hawley, Intermountain Electric Company.

An enlarged program of activities for the coming year is being planned by the league.

An Interesting C.R.E.A. Meeting Held in Fresno Jan. 21

Announcement that the results of the survey of electrified farms in California will be ready for publication in the near future was one of the features of the meeting of the California Committee on the Relation of Electricity to Agriculture at Fresno Jan. 21, 1927. At the same time it was announced that E. D. Merrill, dean of the College of Agriculture of the University of California, had been appointed chairman of the committee to succeed L. J. Fletcher, who recently resigned.

Following the committee session in the morning an open meeting, attended by members of the electrical industry and by farmers in the vicinity of Fresno was held in the San Joaquin Light & Power Corporation's auditorium. Approximately 125 men heard a program in which practical results of the use of dairy sterilizers, electric brooders and walnut dehydrators were recited by farmers. Another feature of the meeting was a display of electrical farm equipment in the show rooms of the Valley Electrical Supply Company.

Christmas Celebrated by Seattle Electric Club.—The Electric Club of Seattle entertained at a Christmas party instead of its usual business session the week preceding Christmas. All electrical men in the city were invited, and a Christmas tree with gifts for all was the feature of the day. The program was presided over by J. D. Ross, president of the club.

San Francisco League Honors Two Prominent Utility Men

J. B. Black and A. Emory Wishon were the guests of honor at a luncheon given by the San Francisco Electrical Development League at the Palace Hotel Jan. 17. Mr. Black, who was formerly vice-president and general manager of the Great Western Power Company of California, is to go East shortly to take up the duties of vice-president of the Western Power Corporation, which controls the Great Western company. Mr. Wishon, who is vice-president and general manager of the San Joaquin Light & Power Corporation, Fresno, also controlled by the Western Power Corporation, has been named to succeed Mr. Black, in addition to retaining his present position.

Ezra W. Decoto, president of the California Railroad Commission, was the principal speaker. Among other things he dwelt on the large number of men trained in the West who have been chosen to fill high positions in the East. R. B. Hale, president of the California Development Association, on behalf of the league complimented Mr. Wishon and welcomed him to San Francisco activities, while C. T. Hutchinson, president of the McGraw-Hill Company of California, paid tribute to Mr. Black's fine qualities and wished him Godspeed. R. E. Fisher, vice-president of the Pacific Gas and Electric Company, in charge of public relations and sales, acted as chairman of the day.

Marin County League Meeting.—The annual business meeting of the Marin County Electrical Development League took place Thursday evening, Jan. 27, with a dinner at Paloma Inn, San Rafael, Calif. Activities for 1927 were discussed.

They Have Finished Lighting and Power Courses

These salesmen of the San Joaquin Light & Power Corporation, Fresno, Calif., Midland Counties Public Service Corporation, San Luis Obispo, and Valley Electrical Supply Company, Fresno, recently completed the lighting and power courses given by the educational committee of the N.E.L.A. In the first row, left to right, are H. H. Courtright, president and manager of the Valley Electrical Company; A. M. Frost, manager of sales for the San Joaquin company; A. G. Wishon, president of that company, and H. N. Carroll, also a member of the San Joaquin organization, who acted as class leader.

Manufacturer & Distributor

New Electrically Equipped Plant for Oakland, Calif.

Another factory, fitted throughout with the most modern electrical equipment, is to take its place in the Western industrial world. A new building at 24th and Peralta Streets, Oakland, Calif., recently has been leased by the **Merco Nordstrom Valve Company,** a subsidiary of The Merrill Company of San Francisco, and will be used for the manufacture of Merco Nordstrom plug valves. Machinery for the new plant now is being ordered, and it is expected that the factory will be ready for operation in the late spring or early summer.

From 1918 to 1923 the manufacture and distribution of Merco Nordstrom plug valves were handled by The Merrill Company. At the end of that time the business had become so large that a separate company, the Merco Nordstrom Valve Company, was organized and incorporated. Since its incorporation the company has been producing valves on the Atlantic seaboard, but the need for a Western factory has been so increasingly urgent that it finally has resulted in the firm's decision to manufacture its product in Oakland also.

Johns-Manville Corporation is the name now being used by that company in place of **Johns-Manville Inc.**

Colt's Patent Fire Arms Manufacturing Company, Hartford, Conn., has announced that **The Johns-Pratt Company,** also of Hartford, has been absorbed by the former company. The trade name "Noark" will continue to be used in connection with those products with which it has been associated for so long a time.

Leonard Refrigerator Company, Grand Rapids, Mich., has announced a 54.6 per cent increase in net sales for the first five months of its fiscal year as compared with the same period last year. This increase does not include cabinets for electric unit manufacturers but applies only to the Leonard standard line of ice refrigerators.

The Frigerator Division of General Necessities Corporation, Detroit, will exhibit the mechanism of its line of electric refrigerators at booths Nos. 112 and 113 at the San Francisco Automobile Show to be held in the Civic Auditorium Jan. 29-Feb. 5, inclusive. All electrical dealers are invited to visit the display. **N. F. Andruss,** 426 Larkin Street, San Francisco, handles the line in that territory.

The National Carbon Company, Inc., has prepared a three-reel moving picture, "Behind the Pyramids," showing in an interesting manner the manufacture, application, operation and care of carbon brushes and other carbon products used in the electrical industry. This picture, which will be presented before technical society meetings, operating department groups, engineering college classes, and similar gatherings, requires about forty-five minutes for showing. Arrangements for showing this film may be made by writing the Carbon Sales Division, National Carbon Company, Inc., 599 Eighth Street, San Francisco.

J. G. Pomeroy & Company, San Francisco and Los Angeles, have been appointed Pacific Coast representatives for **Goodrich Electrical Company,** 1650 Ogden Avenue, Chicago, manufacturers of industrial illuminating equipment.

The Western Hardware & Tool Company, 613 J Street, Sacramento, Calif., is Pacific Coast and Western states distributor of Stephens climbers. The company also manufactures a line of belts, safety straps and similar equipment under the trade name of "Western Special." **Ned Licht** is handling this branch of the business.

Bowie Switch Company, 85 Second Street, San Francisco, has under construction the first unit of a new factory in San Francisco. The new building will have floor space of about 9,000 sq-ft. and is designed to permit the erection of additional units at a later date. Both the offices and factory of the company will be moved to the new location at 19th and Tennessee Streets about Feb. 1, 1927.

Farnham & Cunningham, electrical and sales engineers of Los Angeles, announce that the arrangement whereby they represented the Charles R. McCormick Lumber Company in the sale of creosoted Douglas fir poles has been discontinued, and that they now are doing promotion and engineering work for the following three plants producing such poles: **Pacific Creosoting Company, The J. M. Colman Company** and the **McCormick Lumber Company.** Price-quoting and order-taking will be handled by the McCormick Lumber Company's offices in Los Angeles and San Francisco and by the J. H. Baxter Company, who represent the other two firms in both cities. This arrangement places the services of Farnham & Cunningham at the disposal of both customer and producer throughout California.

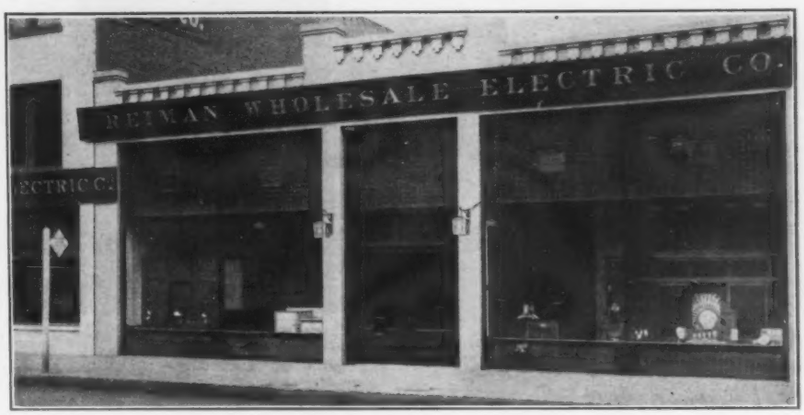
Headquarters of the **electrical refrigeration department** of the **General Electric Company** will be in the Hanna Building, Cleveland. **T. K. Quinn** has been named general manager and **P. B. Zimmerman** sales manager.

W. N. Matthews Corporation, St. Louis, has announced that **Arthur E. Bacon,** 1429 Eighteenth Street, Denver, manufacturers' agent, will represent it in the states of Colorado, New Mexico and Wyoming and part of Nebraska.

Chicago Fuse Manufacturing Company, represented in northern and central California by **A. W. Rockwell,** has opened offices in Room 303 Rialto Building, San Francisco.

Cunningham Electric Company, Seattle, Wash., has announced that it is now in its new quarters at 2726 First Avenue South, with a large stock of electrical, diesel, elevator and hydraulic machinery.

A. B. Vandercook, assistant manager of the Los Angeles branch of the Graybar Electric Company, has resigned to engage in business as a manufacturer's agent.



New annex to the establishment of the Reiman Wholesale Electric Company, 224 East Third Street, Los Angeles. This annex is used for display purposes only.

New Equipment

High-Speed Range Units

For household ranges and equipment requiring a flat-surfaced, closed, high-speed heating unit, Edwin L. Wiegand Company, 422 First Avenue, Pittsburgh, is manufacturing a unit of new construction. It consists of two of its standard Chromalox ring units, of high-

temperature metal sheath, with rivets to hold them in place, in a cast-iron supporting plate. Connection is easily made to the three terminals, which are enclosed completely in a pressed steel adaptor. By using a three-heat switch, three degrees of heat are secured.

Horn and Cone Loudspeaker Console

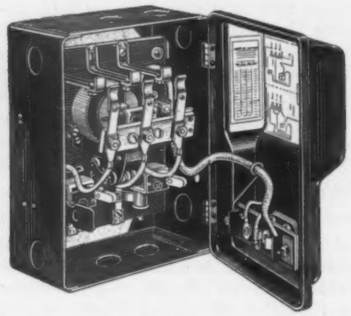
A combination horn and cone loudspeaker console for radio reception, Model 302, is offered by the Windsor Furniture Company, 1420 Carroll Avenue, Chicago. By the use of a compound plug this may be connected so that the horn only, the cone only or both may be used. This model has an

18-in. decorated cone speaker, and the composition horn is installed behind the grill shown in the illustration. The console is 30. in. long, 17 in. deep and 29 in. high. The battery shelf is 26x10¼ in. Cone loudspeaker and sounding board are instantly removable to allow free access from the front to batteries and other equipment on the battery shelf.

Starting Switch

A new across-the-line starting switch, Type J-1552 Form B, recently has been added to its standard line by the **Allen-Bradley Company,** 286 Greenfield Avenue, Milwaukee, Wis.

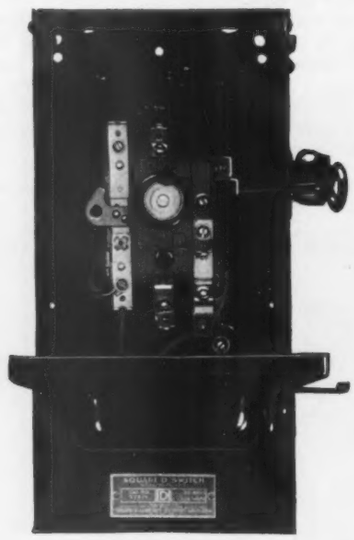
The Form B size marks a new development in magnetic motor starting switches, because it extends the advantages of push-button control,



thermal overload relays, and no-voltage protection to the smaller sizes of motors that heretofore have been started only with knife switches, according to the manufacturer. The new switch is made for motors up to 1½ hp., thus bringing fractional horsepower motors within the range of push-button operation. It measures about 8 in. high, 6 in. wide and 4½ in. deep.

Main Fuse Switch

A new accessible main fuse switch, with distribution cabinet, has been added to its line by the Square D Company, Detroit. This new type switch has main fuses which are accessible



when the switch is "off". The switch has one fuse, one switch blade and a solid neutral. The distribution cabinet provides for two branch circuits. Wiring connections between the switch and the branches are made at the factory.

RECENT PUBLICATIONS

Insulators.—A complete catalog on insulators, electrical wires and cables has been issued by the **Rome Wire Company,** Rome, N. Y., according to announcement of **J. G. Pomeroy & Company.** That company also announces that the Kondu Division of the **Erie Malleable Iron Company,** Erie, Pa., has ready for distribution a new catalog on the Kondu-Box, that Catalog No. 21 has been issued by the **McGill Manufacturing Company,** Valparaiso, Ind., on Loxon guards, Levolier devices and other specialties, and that **Edwards & Company, Inc., New York City,** who have expanded their line of signal devices to include telephone systems, have issued a new catalog on "Edwards Telephones." J. G. Pomeroy & Company are Pacific Coast representatives for the four firms named.

Ingersoll-Rand Company, 11 Broadway, New York, has issued a new and revised edition of the Cameron single-stage, double-suction, volute pump bulletin, Form No. 7059. The booklet gives detailed specifications of the different classes of pumps, contains numerous illustrations and several cross-section plates.

High-Temperature Electric Furnaces.—Automatic & Electric Furnaces, Ltd., London, has issued a catalog, Section K, on Wild-Barfield high-temperature electric furnaces for the heat treatment of high-speed steel and general purposes requiring temperatures up to 1,400 deg. C. These furnaces are used not only for the hardening of high-speed steel but for pottery and other industries.

Transformer Tap Changers.—The advantages of Wagner tap changers are set forth in Bulletin 136 published by the **Wagner Electric Corporation,** St. Louis.

"The Treated Sanded Surface."—Under this title **Ohio Brass Company,** Mansfield, Ohio, describes a feature of the method by which the joints in O-B suspension, multipart, switch and bus insulators have been made for the past ten years.

Vitrohm Resistors for Radio.—Ward Leonard Electric Company, Mount Vernon, N. Y., is distributing Circular 507 covering Vitrohms for current supply units, for plate supply units, for C bias voltages, for power amplifiers, for transmitting circuits, and for special purposes.

Electric Operation of Valves.—Coffin Valve Company, Neponset, Mass., has issued Section 4-B, Part 1, of general catalog, a description of the Kelty motor drive unit, and Section 3-A, covering Dow disc arm pivot valve used as a check valve in pump discharge lines.